

UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

NOVEMBER, 1885.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
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List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological Reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of November, 1885.

Name of vessel.	Observers.	Name of vessel.	Observers.	Name of vessel.	Observers.
Allan Line.		Mallory Line.		State Line.—Continued.	
Br. s. s. Grecian.....	Capt. C. E. Le Gallais.	Am. s. s. Alamo.....	Capt. Sam. Rick.	Br. s. s. State of Pennsylvania.....	Capt. Alfred Mann.
Manitoba.....	R. Carruthers.	Colorado.....	Jas. Daniels.	Thingalla Line.	
Prussian.....	A. McDougall.	Lampasa.....	M. B. Crowell.	Dan. s. s. Geiser.....	F. V. Schierbeck.
Sarmatian.....	Wm. Richardson.	Rio Grande.....	Jas. F. Lewis.	Hekla.....	A. G. Thomsen.
Scandinavian.....	John Park.	San Marcos.....	A. C. Burrows.	Island.....	W. Skjott.
Siberian.....	E. P. Moore.	Mediterranean & New York Steamship Co.	William Bowen.	Thingalla.....	S. T. H. Lamb.
American Line.		Br. s. s. Ponca.....		U. S. and Brazil Mail S. S. Co.	
Br. s. s. British Prince.....	Samuel Nowell.	Mine & Dominion S. S. Co.		Am. s. s. Advance.....	Jas. R. Beers.
British Princess.....	E. H. Freeth.	Br. s. s. Ontario.....	W. P. Conch.	Merrimack.....	Wm. Weir.
Indiana.....	R. W. Sargent.	Toronto.....	Jas. McAuley.	Warren Line.	
Lord Clive.....	P. Urquhart.	Monarch Line.		Br. s. s. Iowa.....	Samuel Walters.
Lord Gough.....	E. M. Hughes.	Br. s. s. Assyrian Monarch.....	John Harrison.	Missouri.....	E. Poland.
Anchor Line.		Grecian Monarch.....	B. J. W. Bristow.	Norseman.....	E. Maddox.
Br. s. s. Australia.....	J. J. Small.	Lylian Monarch.....	Thos. C. Huggett.	White Cross Line.	
Australia.....	Alex. McRitchie.	Persian Monarch.....	J. Watson.	Br. s. s. De Ruyter.....	J. J. Brarons.
Circassia.....	A. Campbell.	Morgan's L. & Tams R. R. & S. S. Co.		Jan Breydel.....	H. Meyer.
City of Rome.....	B. D. Munro.	Am. s. s. Chalmette.....	Robt. B. Quick.	Pieter de Coninck.....	E. Smit.
Columbia.....	E. Th. Garvie.	El Dorado.....	J. W. Hawthorne.	White Star Line.	
Devonia.....	Hugh Young.	Lone Star.....	Geo. W. Mason.	Br. s. s. Adriatic.....	H. Parsell.
Trinacria.....	Geo. Mitchell.	National Line.		Celtic.....	Benj. Gleadell.
Acove Line.		Br. s. s. Canada.....	Wm. Pearce.	Germanic.....	C. W. Kennedy.
Br. s. s. Critic.....	W. R. Lord.	Denmark.....	Geo. Cochrane.	Republic.....	P. J. Irving.
Atlantic Transportation Company.		Egypt.....	R. W. Grace.	Wilson Line.	
Br. s. s. Surrey.....	H. Murrell.	England.....	T. P. Heeley.	Br. s. s. Bassano.....	T. J. Moore.
Atlas Line.		Erie.....	John Robinson.	Gallio.....	Richard Potter.
Br. s. s. Albia.....	J. W. Sansom.	Greece.....	A. J. Jeffrey.	Lepanto.....	B. H. Rogers.
Albano.....	H. B. Hughes.	Helvetia.....	John Milligan.	Salerno.....	Wm. Abbott.
Alva.....	David Williams.	Holland.....	Wm. Tyson.	Watts, Ward Line.	
Andes.....	D. de Amézaga.	Navigazione Generale Italiana.		Br. s. s. Action.....	R. P. Gowing.
Antillas.....	B. Moran.	Br. s. s. Archimede.....	Domenico Viola.	Richmond.....	Jacob Garson.
Charibel.....	T. M. McKnight.	Independente.....	P. Pirandello.	Miscellaneous.	
Booth's S. S. Co. (Limited).		Gottardo.....	G. Diliberto.	Br. s. s. Aborac.....	Robt. Temple.
Br. s. s. Clement.....	Thomas Burley.	New York and Cuba Mail S. S. Co.		Brutus.....	J. A. Voeg.
Cyril.....	J. H. Johnson.	Am. s. s. Cienfuegos.....	C. M. Faircloth.	Bedford.....	Thos. Aitkenhead.
Island City Line.		N. Y., Havana & Mexican Mail S. S. Co.		Camden.....	S. B. Chandler.
Br. s. s. Brooklyn City.....	W. Fitt.	Am. s. s. City of Alexandria.....	J. W. Reynolds.	Cranbrook.....	John W. Harvey.
Lindisfarf City.....	T. H. Gore.	City of Washington.....	W. M. Rettig.	Coventry.....	W. C. Bacon.
Wells City.....	T. L. Weiss.	North German Lloyd Steamship Co.		Edith Golden.....	John H. Bennett.
California and Mexican Steamship Co.		Ger. s. s. America.....	G. Meyer.	El Callao.....	Jos. Scholts.
Am. s. s. Newbern.....	E. Middlestadt.	Donau.....	C. Puhle.	Elstow.....	Thos. Robertson.
Canado Shipping Co.		Kider.....	H. Helmers.	Joseph Ferens.....	John J. Mehegan.
Br. s. s. Lake Nepigon.....	M. L. Tranmar.	Elbe.....	F. Hamelmann.	Lorenzo D. Baker.....	Warren F. Wiley.
Cromwell Line.		Elms.....	W. Willigerod.	Br. s. s. Mensaleh.....	J. B. McKie.
Am. s. s. Louisiana.....	E. N. Gager.	Falda.....	B. Ring.	Pomona.....	C. E. Cook.
Hudson.....	H. B. Freeman.	Main.....	H. Christoffers.	Prydain.....	Moosa Parry.
Chard Line.		Neckar.....	F. Pfeiffer.	Roman.....	David Williams.
Br. s. s. Auraria.....	W. H. P. Hains.	Nürnberg.....	A. Jaeger.	St. Rouais.....	Henry Campbell.
Catalonia.....	Alex. McKay.	Werra.....	R. Busius.	Strathleven.....	James Adams.
Cephalonia.....	Henry Walker.	Occidental and Oriental Steamship Co.		Sulina.....	C. W. Pearson.
Etruria.....	T. Cook.	Br. s. s. Oceanic.....	John Metcalfe.	Valencia.....	Thos. Potter.
Gallia.....	M. Murphy.	Ocean Steamship Company.		Veranunus.....	Ch. Off. J. A. Estopiñá.
Pavonia.....	B. Woolfenden.	Am. s. s. City of Augusta.....	K. S. Nickerson.	Viola.....	Capt. John Legue.
Scythia.....	W. Whelan.	Junata.....	S. L. Aakins.	Sailing vessels.	
Servia.....	W. McMickan.	Chattahoochee.....	J. W. Catharine.	Am. bk. Abbie Clifford.....	D. W. Stores.
Edward Carr's S. S. Line.		Nacoochee.....	Ch. Off. C. G. S. Burg.	Br. bk. Abyssinian.....	John Hughes.
Ger. s. s. Australia.....	G. Franck.	Oceanic Steamship Company.		bk. Achab.....	Alfred M. Shaw.
California.....	O. Winkler.	Am. s. s. Alameda.....	Capt. H. G. Morse.	bk. Albemarle.....	W. H. Forbes.
Europa.....	L. A. Kennal.	Barlpos.....	H. M. Hayward.	bk. Antonia Sala.....	F. H. Mitchell.
Polynesia.....	A. Kuhn.	Old Dominion Steamship Company.		bk. Artemis.....	E. E. Moe.
Furness Line.		Am. s. s. Manhattan.....	Frank Stevens.	bk. Betty.....	S. Wohlmut.
Br. s. s. Albania.....	W. Malloney.	Oregon Railway and Navigation Co.		Br. bk. Charles S. Whitney.....	Geo. D. Spicer.
Durham City.....	M. P. Lund.	Am. s. s. City of Chester.....	Thomas Wallace.	Br. bkt. Corisande.....	Daniel Thoms.
Stockholm City.....	K. Doyle.	Columbia.....	Fred Bolles.	Am. bk. Elsie H. Lister.....	Smith D. Mason.
General Trans-Atlantic Steamship Co.		Oregon.....	E. Polemann.	Am. bk. Florence Rogers.....	J. S. F. McLeod.
Fr. s. s. Amérique.....	E. Santelli.	Pacific Coast Steamship Company.		bk. Gamaliel.....	C. S. Powell.
Canada.....	G. de Kerabiec.	Am. s. s. Mexico.....	T. Huntington.	Br. bgt. George.....	W. H. Champlin.
Germany.....	M. de Jousselin.	Orizaba.....	John N. Ingalls.	Am. bk. Governor Hall.....	John Cain, Jr.
Labrador.....	F. d'Hauterive.	State of California.....	G. Debey.	Ger. bk. Hedwig.....	Th. Minnen.
Normandie.....	E. Frangul.	Santa Rosa.....	C. B. Johnson.	Br. bk. Harry and Aubrey.....	J. N. Tedford.
St. Laurent.....	M. de Jousselin.	Pacific Mail Steamship Company.		Am. bk. Idaho.....	W. S. Richardson.
Great Western S. S. Line.		Am. s. s. Acapulco.....	W. G. Shackford.	Br. bk. Lillian.....	H. F. Schlive.
Br. s. s. Dorset.....	Ch. Off. Wm. H. Bates.	Australia.....	C. C. Brough.	Am. bk. Maggie Abbott.....	D. C. McIntosh.
Warwick.....	Capt. P. F. Lobbett.	City of New York.....	Robt. R. Searle.	bk. Mary Fink.....	Daniel B. Darrah.
Guin Line.		City of Para.....	L. Dexter.	Am. bk. Nelson Bartlett.....	Samuel Watts.
Br. s. s. Abyssinia.....	J. Price, R. N. R.	City of Peking.....	G. G. Berry.	Nor. bk. Nordcap.....	E. Salvensen.
Alaska.....	Geo. S. Murray.	City of Rio Janeiro.....	Wm. R. Cobb.	Ger. bk. Palme.....	William Bahl.
Arizona.....	J. Price, R. N. R.	City of Sydney.....	H. C. Dearborn.	Am. bk. River Ganges.....	Thos. Nalle.
Nevada.....	John Douglas.	Colima.....	J. M. Caverly.	bk. Sarah D. J. Rawson.....	Thos. D. French.
Wisconsin.....	Edward Bentley.	San Blas.....	Thos. Chapman.	Br. bk. Servia.....	Edw. M. Smith.
Wyoming.....	C. L. Bigby.	San José.....	A. D. Austin.	Ger. bk. Union.....	H. Fokken.
Hambury-American Line.		Quebec Steamship Company.		bk. Western Chief.....	Fr. Sander.
Get. s. s. Gellert.....	W. Kühlewein.	Br. s. s. Bermuda.....	R. Fraser.	New York Herald Weather Service.	
Hammoula.....	H. F. Schwenson.	Muriel.....	G. S. Locke.	Am. s. s. Acapulco.....	W. G. Shackford.
Lesning.....	B. Voss.	Orinoco.....	Jas. S. Garvin.	Br. bk. Adriatic.....	H. Parsell.
Moravia.....	O. Pesoldt.	Red "D" Line.		Br. bk. Alena.....	J. W. Sansom.
Rhætia.....	H. Vogelgesang.	Am. s. s. Carunc.....	W. M. Hopkins.	Am. bk. Algiers.....	E. J. Seiders.
Rugia.....	A. Albers.	Philadelphia.....	Sam. Hess.	Br. bk. Arizona.....	J. B. Percy.
Suavia.....	C. Ludwig.	Valencia.....	Wm. Woodrick.	Br. bk. Belgeland.....	Sam. Brooks.
Wieland.....	C. Heibich.	Red Star Line.		Belg. bk. Belgeland.....	W. A. Brynon.
Harrison Line.		Belg. s. s. Belgeland.....	W. A. Beynon.	Br. bk. City of Alexandria.....	J. W. Reynolds.
Br. s. s. Author.....	Robt. Budd.	Nederland.....	Allen J. Griffin.	Br. bk. City of Chicago.....	Fred Watkins.
Iman Line.		Noordland.....	H. E. Nickels.	Celtic.....	Benj. Gleadell.
Br. s. s. City of Berlin.....	Francis S. Land.	Pennland.....	Rud. Weyer.	Am. bk. City of Puebla.....	John Deaken.
City of Chicago.....	Fred Watkins.	Rhyndland.....	J. C. Janison.	Br. bk. Charibel.....	T. M. McKnight.
City of Richmond.....	A. W. Lewis.	Switzerland.....	H. Buschmann.	Am. bk. City of Richmond.....	Arthur Lewis.
Johnson Line.		Westland.....	J. Ueberweg.	Am. bk. Colon.....	Chas. Lima.
Br. s. s. Nessmore.....	John Inch.	Westland.....	W. G. Randle.	bk. Chalmers.....	Robt. B. Quick.
Lampert & Holt's Steamship Company.		Zeeland.....	Capt. L. D. Smet.	Ger. bk. Donau.....	C. Puhle.
Br. s. s. Bessel.....	Chas. J. Watson.	Rotterdam Line.		bk. Ems.....	W. Willigerod.
Biel.....	Fred Graham.	Ditch, s. s. Edam.....	J. H. Taat.	Dan. bk. Geiser.....	F. V. Schierbeck.
Dalton.....	J. Russell.	Leerdam.....	P. Sierendrecht.	Ger. bk. Lesning.....	B. Voss.
Euclid.....	Alex. W. Pym.	P. Caland.....	T. H. Bonjer.	Ditch, bk. P. Caland.....	F. H. Bonjer.
Hevelius.....	John Carroll.	Schiedam.....	G. Bakker.	Br. bk. Persian Monarch.....	Jas. Watson.
Belg. s. s. Hipparchus.....	Wm. Kelly.	W. A. Scholten.....	G. J. Vis.	Br. bk. Pennland.....	B. Weyer.
Br. bk. Lassel.....	Robt. Graham.	Zaandam.....	H. von der Zee.	Br. bk. Republic.....	P. J. Irving.
Mozart.....	Wm. Spratly.	Royal Mail Steam Packet Company.		Br. bk. Rhyndland.....	J. C. Janison.
Olbers.....	James Clarke.	Br. s. s. Minho.....	W. Chapman.	Br. bk. State of Pennsylvania.....	A. J. Mann.
Ptolemy.....	John P. Bevis.	State Line.		Br. bk. State of Nebraska.....	A. G. Brues.
Legland Line.		Br. s. s. State of Georgia.....	G. Moodie.	Belg. bk. Switzerland.....	H. Buschmann.
Br. s. s. Venetian.....	W. H. Trant.	State of Indiana.....	A. Ritchie.	Fr. bk. St. Laurent.....	M. de Jousselin.
Virginian.....	M. Fitt.	State of Nebraska.....	A. D. Brues.	Ditch, bk. W. A. Scholten.....	G. J. Vis.
		State of Nevada.....	John A. Stewart.		Com. W. G. Randle.

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INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during November, 1885, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i.

The paths of the centres of eight areas of low pressure are traced on chart i, this number being four less than the average for November during the last thirteen years. That described as number viii was the severest storm of the month, and on reaching the Atlantic coast caused severe gales from Eastport, Maine, to Wilmington, North Carolina, and unusually high tides on the New Jersey coast.

A prominent feature in connection with the meteorology of the month was the unusually low mean pressure over nearly the whole country, the departures from the normal being greatest on the north Pacific coast, where they ranged from .25 to .35; over the greater part of the country east of the Rocky Mountains the departures ranged from .10 to .22.

The mean temperature was above the normal in all districts, except in the south Atlantic and east Gulf states, where the month was slightly colder than the average November. The greatest departures above the normal temperature occurred in the extreme northwest and in northern and central Rocky Mountain districts, where they generally ranged from 6° to 10°.

The rainfall on the Pacific coast was remarkably heavy, and caused destructive freshets in that region. On the middle Pacific coast the rainfall was about ten inches in excess of the average. The rainfall was also considerably in excess of the average in the middle Atlantic states, while over the interior and southwestern districts there was a general deficiency.

In the preparation of this REVIEW the following data, received up to December 20, 1885, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-three Signal Service stations and eighteen Canadian stations, as telegraphed to this office; one hundred and seventy-one monthly journals and one hundred and sixty-four monthly means from the former, and eighteen monthly means from the latter; two hundred and seventy-two monthly registers from voluntary observers; forty monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the New England Meteorological Society, and from the local weather services of Alabama, Indiana, Iowa, Minnesota, Nebraska, Ohio, and Tennessee,

and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The mean atmospheric pressure for November, 1885, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

An area of barometric maxima covers the central Rocky Mountain districts, the pressure being greatest over Colorado and Utah, where the monthly mean exceeds 30.2. The mean pressure is least on the north Pacific coast, over which region the barometric means fall to 29.75, or about .50 lower than those at stations in the central Rocky Mountain districts. Over the southern districts to the eastward of the one hundredth meridian the mean pressure ranges from 30.0 to 30.05; while in the northern districts to the eastward of the same meridian there is a gradual decrease from 30.05, in Dakota, to 29.9, in Canadian Maritime Provinces and northern New England.

Compared with the mean pressure for the preceding month, there has been an increase in the extreme northwest and in all southern districts, the difference being greatest in the middle and southern plateau districts, where it varies from .10 to .19. In the middle Atlantic states, upper lake region, and in the upper Mississippi, Missouri, and Ohio Valleys, the pressure has differed but slightly from that for the preceding month. In New England and the Canadian Maritime Provinces, and from central Montana westward to the Pacific coast, a marked decrease has occurred; in the first-named districts the difference ranges from .10 to .17, and in the last-named from .10 to .27.

The departures from the normal pressure at the various Signal Service stations are given in the tables of miscellaneous meteorological data, and on chart iv they are exhibited by lines connecting stations of equal departure. Except over a small area, including portions of Arizona and New Mexico, the mean pressure for November, 1885, has been below the normal throughout the country. The departures are unusually large over the greater part of the country; east of the one hundredth meridian they exceed .10 in nearly all districts, and on the middle Atlantic and southern New England coasts they are above .20. The most marked departures occurred on the north Pacific coast, where they range from .20 to .35. These abnormal departures form the most marked meteorological feature of the month.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the tables of miscellaneous data. They were greatest on the north Pacific coast, and over portions of the Missouri Valley and eastern slope; they were least over Florida, Arizona, and southern California.

The following are some of the extreme ranges:

Greatest.		Least.	
	Inches.		Inches.
Fort Canby, Washington Territory.....	1.17	Key West, Florida.....	0.34
Olympia, Washington Territory.....	1.16	San Diego, California.....	0.39
Port Angeles, Washington Territory.....	1.13	Los Angeles, California.....	0.48
Portland, Oregon.....	1.12	Pensacola, Florida.....	0.49
North Platte, Nebraska.....	1.03	Cedar Keys, Florida.....	0.50
Omaha, Nebraska.....	1.03	Sanford, Florida.....	0.55
Leavenworth, Kansas.....	1.03	Fort Grant, Arizona.....	0.56

AREAS OF HIGH PRESSURE.

Five areas of high pressure occurring during the month are described. In two instances, although the areas spread slowly eastward over all districts, the centre of greatest pressure remained for several days over Colorado and Utah, disappearing only on the formation of an area of low pressure in the vicinity. During a large proportion of the month the pressure was greatest over Colorado and Utah. The first killing frosts of the season in Tennessee, Georgia, North and South Carolina occurred during the passage of area number i, and in Florida during the passage of area number v.

I.—Immediately following the passage of low area number i, the pressure increased slightly in the upper Mississippi and Missouri Valleys. The pressure continued to increase steadily, and a well-defined area of high pressure resulted, which was central on the morning of the 3d in Tennessee, causing killing frosts, the first of the season, in Tennessee, Georgia, North and South Carolina. The area was not extensive, and after its appearance moved in a southeasterly direction; it disappeared off the coast of the south Atlantic states on the 4th.

II.—The pressure began to increase somewhat over the western territories after the passage of low area number iv. At the morning report of the 7th the centre of greatest pressure was over Colorado. At this hour the temperature in the states and territories west of the Mississippi River had fallen from 10° to 20°. As the pressure increased in rear of low area there was a regular diminution of about 20° in temperature in all districts. The centre of greatest pressure remained persistently stationary over Colorado from the 7th to the 10th; on the latter date it became dissipated by the formation of low area number vi. A light "norther" occurred in Texas on the 7th.

III.—This decided area of high pressure made its appearance on the north Pacific coast at midnight of the 10th. The morning report of the 11th showed a decided fall in temperature in Washington Territory, Oregon, and adjacent territories, and the indications were that the area would move in a southeasterly direction. During the day cold-wave signals were ordered for all stations from the Mississippi River as far west as Cheyenne, Wyoming, and Denver, Colorado, and warnings of a "norther" sent to all railroads and other interested parties in the regions to be affected. At midnight the display of cold-wave signals was extended east to Buffalo, New York. At 7 a. m. of the 12th the centre of greatest pressure was over Utah, and the temperature in the Missouri Valley and thence westward to Utah had fallen about 20°. The area moved slowly eastward, causing a severe "norther" in Texas, Indian Territory, Kansas, and Nebraska. Killing frosts occurred on the morning of the 13th in northern Texas and northern Louisiana, and on the 14th in Georgia and Alabama. The cold wave, moving easterly, covered all districts and finally disappeared into the Atlantic on the 15th. After the centre of area reached Utah it remained stationary till the 15th, the pressure diminishing slightly each day. The area, however, gradually extended itself over all districts east of the Rocky Mountains. On the morning of the 17th the pressure was greatest over the middle Atlantic states, and passed off into the Atlantic during the day.

IV.—The pressure began increasing in Idaho on the 17th, and by the morning of the 18th a well-defined area of high pressure was central in Colorado, where the temperature had fallen over 20°. As with areas numbers ii and iii, the centre of greatest pressure remained stationary over Colorado and Utah, but the area gradually extended itself eastward, accompanied by a fall in temperature of about 20° in all districts. The cold wave passed off into the Atlantic on the 20th, the pressure decreasing slightly from the Atlantic coast to the Rocky Mountains.

V.—In rear of low area number viii the pressure began rapidly to increase on the 20th, with a corresponding diminution of temperature. On the 22d the area of high pressure extended from New Mexico to the upper lake region. In the

west Gulf states and Missouri Valley the winds shifted to northerly and the temperature fell about 20°. This diminution of temperature followed the storm, and the cold wave disappeared off the Atlantic coast on the 24th. On the 23d the pressure continued to increase over the upper lake region, where the area was central. It remained nearly stationary for two days, after which it moved slowly in a southeasterly direction and passed into the Atlantic on the 27th. Killing frosts occurred during its passage as far south as Jacksonville, Florida.

AREAS OF LOW PRESSURE.

Eight areas of low pressure have passed over the country during the month. Area number ii was very severe on the New England coast, and area number viii very severe on the New Jersey and New England coasts. Numbers ii and v. approached the districts bordering on the Atlantic from the sea. All other areas formed west of the Mississippi River. Number viii proved to be the severest storm on the Atlantic coast during the month; it advanced with great rapidity until it reached the Chesapeake Bay, after which its movement was greatly retarded and it remained nearly stationary off the New Jersey coast for two days, causing severe gales and high tides from Virginia to Maine.

The following table shows the latitude and longitude in which the centre of each low area was first and last observed, with the average rate of movement in miles per hour:

Low areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° /	° /	° /	° /	
No. I *	38 00	101 00	47 00	81 30	19.5
II	34 00	76 00	50 00	66 00	24.6
III	46 30	107 00	45 00	83 00	29.7
IV	36 00	100 00	48 00	87 00	23.2
V	39 00	72 00	50 00	62 30	29.2
VI	41 45	96 00	46 30	79 30	19.7
VII	44 30	98 00	47 00	58 00	31.2
VIII	39 00	101 00	41 00	70 00	18.2
Mean hourly velocity					24.4

* Continuation of number viii for October, 1885.

I.—The early movements of this area were described in the REVIEW for October. At midnight of the 31st the depression was central in Illinois, moving in a northeasterly direction. The morning report of November 1st showed the area to be central in northern Indiana. At this report precipitation had occurred in the Lake region, Ohio Valley and Tennessee, upper Mississippi Valley, and eastern Gulf states. The winds in the lower lake region had shifted to southeasterly, with increasing force, and during the day, as the depression, continuing its northeasterly course, passed over the upper lake region and disappeared beyond stations of observation north of Lake Huron, they veered to the west, with diminishing force. This area had but little energy and was unaccompanied by high winds, except in the lower lake region.

II.—As low area number i disappeared, the midnight report of the 1st showed the presence of another depression on the North Carolina coast. General rains were then falling in the middle and south Atlantic states, and brisk to high northeasterly winds prevailed on the coast. On the morning of the 2d the depression was central off the New Jersey coast, and the area of precipitation covered the New England states. Severe gales occurred on the coast from Cape Hatteras to Eastport, Maine, the velocity of the wind at the various stations ranging from thirty to fifty-two miles an hour. The depression moved in a northerly direction and was central at the afternoon report over Lake Champlain. From Lake Champlain it moved northeasterly until the midnight report, when it was central near Rockliffe, Province of Ontario. This abnormal track was caused by an area of high pressure which appeared off the Nova Scotia coast. After making its appearance, this area of high pressure rapidly passed off in a southeasterly direction and permitted the depression to move eastwardly. The morning report of the 3d showed the area to be central in northern

Maine, and on that date it passed off into the Gulf of Saint Lawrence. Relative to this storm, the observer at Boston reports: "This storm was very severe all along the coast, in fact, the most severe for many years, and much damage was done; chimneys and church spires were blown down; a number of vessels in Boston harbor were damaged, and a number of yachts in Salem harbor broke from their moorings and were wrecked." The observer at New London says: "This was the strongest gale experienced at this station in five years. No vessel, steamer or sail, attempted to leave the harbor. The Osprey Beach wharf was partially destroyed, and the adjoining one of the Pequot and Ocean Transit Company was carried away." On the morning of the 2d the following message was sent to the secretary of the Maritime Exchange, New York City:

Dangerous storm on New Jersey coast, which has entered from the sea. Severe gales will occur to-day from Connecticut to Nova Scotia. The wind at New York City and southward will be strong northwesterly.

HAZEN.

Cautionary signals were ordered on the morning of the 1st from Norfolk, Virginia, to Narragansett Pier, Rhode Island, and from Newport, Rhode Island, to Eastport, Maine, at midnight.

III.—The barometer began falling in the vicinity of British Columbia during the night of the 1st-2d, but no well-defined depression formed till the afternoon of the 2d, when a low area was found to be central in Montana. It pursued a southerly direction until it reached Kansas, where it was central on the afternoon of the 3d, after which it altered its course and moved northeastwardly, with constantly diminishing energy, until it reached Lake Huron at midnight of the 4th, where it ceased to exist as a well-defined area. General rains fell in the Lake regions and Ohio Valley during its passage. It was not accompanied by high winds.

IV.—This area formed in the western portion of the Indian Territory during the afternoon of the 5th, at which time rains were falling in the Gulf States, Ohio Valley and Tennessee, Lake regions, upper Mississippi and Missouri Valleys. The wind had increased considerably in force in the western Gulf states, and was blowing on the coast at the rate of thirty miles an hour. On the morning of the 6th the depression was central in eastern Kansas. Cautionary signals, which were ordered at all stations in the Lake regions for low area number iii, were continued. The morning report of the 7th showed the depression to be central in southern Minnesota, and brisk to high winds prevailed in the Lake regions. At midnight of the 7th the area passed beyond the stations of observation, north of Lake Superior. This storm was very severe at Duluth, Minnesota, and other stations on Lake Superior. During its passage precipitation occurred in all districts, and tornadoes are reported as having occurred in Illinois, Tennessee, and Alabama on the 6th.

V.—Instead of clearing in the middle Atlantic and New England states, after the disappearance of low area number iv, the precipitation became more general and continuous, and the winds on the New Jersey coast increased greatly in force, giving evidence of the formation or approach of a depression. At the midnight report of the 8th a weak depression was found to be present on the New Jersey coast. It moved in a north-northeast direction, increasing somewhat in energy, and passed into the Gulf of Saint Lawrence on the 10th. No high winds marked its passage along the New England and Middle States, but dangerous gales were reported from stations bordering on the Gulf of Saint Lawrence, and in the Saint Lawrence Valley.

VI.—A rapid fall of the barometer in the northwestern territories during the 10th gave indications of the formation of an area of low pressure in that locality, and by the morning of the 11th a well-defined area had formed in the Missouri Valley. Light snows began falling in that district during the day and in the upper Mississippi Valley during the night. This area increased somewhat in energy as it approached the upper lake region, where it was central on the morning of the 12th, causing dangerous gales on the Lakes. The morning

report of the 13th showed the centre of depression to be near Rockliffe, Province of Ontario, and on that date it passed beyond the limits of observation. General precipitation occurred in all districts during its passage.

VII.—At the morning report of the 17th an area of low pressure was found to be central in Dakota. On the morning of the 18th it was central south of Lake Michigan. At that hour general rains were falling in the Lake regions, Ohio Valley, and Tennessee. The depression moved rapidly eastward, passing over the Lake regions, accompanied by high winds, and was central in Massachusetts on the morning of the 19th. This report showed that the rain-area had extended to the New England and middle Atlantic states. The winds on the coast shifted to northwesterly and increased to gales. On the morning of the 20th the area was central over the Gulf of Saint Lawrence, and disappeared on that date.

VIII.—Falling barometer and rising temperature on the 20th, in Colorado, gave unmistakable evidence of the formation of a depression in that vicinity, and the 7 a. m. report of the 21st showed a well-defined area of low pressure central in western Kansas; it moved eastward during the day, with the ordinary velocity, and by the morning of the 22d was central near Cairo, Illinois. High area number v, which made its appearance in the extreme northwest, caused the depression, after reaching Cairo, Illinois, to alter its direct easterly movement to a southeasterly direction, and greatly increased its velocity of translation. At midnight of the 22d it was central in western North Carolina, where it again changed its course to the northeast, and was moving with considerable rapidity. On the morning of the 23d it was central over the Chesapeake Bay. During the afternoon of the 22d, when the storm was central in Tennessee, cautionary signals were ordered at all stations on the Atlantic coast from Wilmington, North Carolina, to New York City, and at midnight from New Haven, Connecticut, to Eastport, Maine. On the morning of the 23d the following message was sent to the secretary of the Maritime Exchange, New York City:

Storm now central over Chesapeake Bay, which will move northeasterly along the Atlantic coast, causing dangerous northeasterly winds.

HAZEN.

General precipitation in all districts accompanied the passage of this area, followed by clearing weather in the Western and Southern States. The morning report of the 23d showed that the area of high pressure was gradually spreading over the Provinces of Ontario and Quebec, but there was no indication of the presence of a high area to the eastward which would retard the progress of the depression. It was believed that on reaching the Atlantic coast the depression would follow the usual course of storms by following the Gulf Stream and disappearing in about sixteen hours, and be followed in the middle Atlantic states by clearing weather; therefore a prediction to this effect was made. The afternoon report of the 23d, however, showed that, for some reason, the depression had ceased its previous rapid movement and remained nearly stationary. The centre at that hour was near Chincoteague, Virginia; at 10 p. m. it was near Atlantic City, New Jersey, and at 7 a. m. of the 24th it was near Barnegat City, New Jersey; at 3 p. m. between Barnegat City and Sandy Hook, New Jersey; at 10 p. m. off Sandy Hook; at 7 a. m. of the 25th it was near the extremity of Long Island, and, at 3 p. m., it was off the southern coast of Massachusetts. After the last-mentioned report it disappeared. From the 23d to the 26th, inclusive, violent gales prevailed all along the Atlantic coast, and the highest tides known for many years are reported as having occurred. A study of the conditions in connection with the movement of this area has failed to discover any satisfactory reason for its great retardation after reaching the Atlantic. The cause, however, may be determined when all reports of vessels crossing the Atlantic on the dates named are received and studied. The highest pressure was in rear of the storm, which increased its progressive movement after reaching Cairo, Illinois. Over Nova Scotia the pressure was not abnormally high, and, therefore, the only

supposition is that an area of high pressure was present at sea, moving slowly southeastward from Newfoundland, checking the progress of the low area.

The following are extracts from reports in connection with this storm, made by the observers at the cities named:

New York City: "Gale began at 4 a. m. of the 23d and continued until 3 p. m. of the 24th; very severe in this vicinity and on the New Jersey coast. It was accompanied by the highest tide known for forty-five years, doing much damage to sewers and cellars."

New London, Connecticut: "A gale, which attained great violence, began at 10.05 a. m., 24th. The barge 'Grinnel' in tow of the 'America,' both of this city, was lost in the gale off Highland Light, New Jersey, and her crew of three men were drowned."

New Haven, Connecticut: "Heavy northeaster on the Sound all day; highest tide in twenty-nine years; it rose three feet above high-water mark, covering the wharves."

Chincoteague, Virginia: "Cautionary signals hoisted at 8.10 a. m. of the 23d. The wind during the night and early a. m. blew fresh from the southwest, veering to west at noon. A high wind began at 1 p. m. and continued all day. Remarkably high tides prevailed, submerging the water front of the island."

Portland, Maine: "High tide in the harbor yesterday and to-day, being three feet higher than usual."

Boston, Massachusetts: "This gale continued for four days and was very severe all along the coast. Ample warning was given, and all vessels remained in harbor. No damage reported to shipping in this section. The storm caused very high tides, and considerable damage was done to property along the beach."

NORTH ATLANTIC STORMS DURING NOVEMBER, 1885.

[Pressure expressed in inches and millimetres; wind-force by scale of 0-10.]

The tracks of the areas of low pressure that have appeared over the north Atlantic Ocean are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and reports collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data received at this office up to December 22, 1885.

The paths of nine areas of low pressure are shown on the chart for November, 1885; three of these, viz., numbers 5, 7, and 9, were apparently continuations of storms which passed into the Atlantic from the American continent. Two, numbers 1 and 3, appeared on the Banks of Newfoundland, and one, number 6, over the Gulf of Saint Lawrence; one, number 2, occupied the ocean to the northwest of the British Isles during the 2d and 3d, and of the remaining areas of low pressure, that traced as number 8 apparently developed over the ocean between the coast of the United States and Bermuda, prior to the 21st, while that traced as number 4 appeared in the vicinity of the Azores during the second decade of the month. The general direction of movement of the storm-centres was northeasterly or east-northeasterly, inclining to the southward after the storm-centres had passed to the eastward of the thirtieth meridian.

The month of November, 1885, was marked by generally unsettled weather and moderate to strong gales; the atmospheric pressure over the region covered by the reports was comparatively low throughout the month, and especially so during the last decade, when the storms traced as numbers 8 and 9 moved over the ocean.

The following are brief descriptions of the low areas charted:

1.—This area of low pressure occupied the Banks of Newfoundland on the 1st, the pressure near the centre of disturbance being about 29.55 (750.6). Strong n. winds prevailed over

the region west of the fiftieth meridian, but moderate to fresh breezes only were reported over the ocean to the eastward, the barometric gradients in front of the depression being very slight. On the 2d the region of low pressure was shown near N. 50°, W. 30°, where the barometer read 29.57 (751.1), with strong breezes to moderate n. gales between W. 35° and 45°, and strong sw. winds to the eastward of the first-mentioned meridian. By the 3d this depression had apparently filled in.

2.—This low area appeared on the 2d between N. 55° and 60° and W. 20° and 30°; on that date the s. s. "State of Nebraska," A. G. Braes, commanding, in N. 54° 54', W. 17° 14', had a whole gale from sw. to w., the barometer falling to 29.35 (745.5) at 8 p. m. On the 3d the disturbance was off the north-west coast of Ireland, causing moderate sw. gales near the coastline and southward to the fiftieth parallel, while strong nw. gales prevailed over the ocean between N. 50° and 55°, and from W. 17° westward to 30°.

3.—This area of low pressure appeared over the Banks of Newfoundland on the 4th. At midnight of the 3d the s. s. "Holland," Wm. Tyson, commanding, in about N. 42° 41', W. 60° 18', had a strong breeze to moderate s. gale, barometer 29.69 (754.1), and by morning of the 4th the wind had shifted to w. and was blowing a moderate gale, with heavy squalls and rainy weather. At 4 a. m. (Greenwich time) on the 4th, Captain G. Mitchell, commanding the s. s. "Trinacria," reported having experienced a very heavy swell from s., wind moderate; 10 a. m., thunder, lightning, and heavy rain, with wind squalls of hurricane force, very heavy sea from southward; at 11.30, barometer 29.79 (756.7), wind hauling to w., light breeze, weather clearing (ship's position at noon, Greenwich time, N. 42° 00', W. 52° 10'). The s. s. "Ems," W. Willigerod, commanding, in N. 45° 00', W. 54° 00', on the 4th, had barometer 29.53 (750.0), strong se. to sw. and wnw. gale. On this date nearly all vessels between N. 45° and 50° and W. 40° and 50° reported strong s. gales, shifting to sw. and wsw. During the 5th, 6th, and 7th this low area moved slowly northeastward, with pressure ranging from 29.25 (742.9) to 29.65 (753.1), and attended by moderate to strong gales from sw. to w. and nw. over the region between N. 45° and 53°, and from W. 50° to 25°. On the 8th the storm-centre was probably near N. 55°, W. 25°, where the barometer ranged from 29.4 (746.7) to 29.6 (751.8), and by the following day it had passed beyond the range of the observations.

4.—A decrease of pressure occurred near the Azores on the 8th, and by the 9th the barometer in that region had fallen to 29.5 (749.3); the decrease continued during the 9th, and on the 10th vessels near the Azores had barometer down to 29.16 (740.7), the s. s. "Poncea," W. Brown, commanding, in N. 36° 45', W. 28° 0', reporting barometer 29.16 (740.7), wind wnw., force 5, and the bark "River Ganges," Thomas Naile, commanding, in N. 37° 43', W. 30° 50', barometer 29.27 (743.4), wind nw., force 7. Captain Pearson, commanding the s. s. "Strathleven," in N. 36° 37', W. 13° 53', on the 10th, had barometer 29.96 (761.0), falling, wind sse., force 5, weather overcast, lightning in w. and sw. During the 10th the storm-centre moved slowly eastward, and on the 11th it was near N. 37°, W. 20°; the s. s. "Strathleven" had a strong gale from sse. to nw., which lasted until the 13th. The lowest barometric reading, 29.14 (740.1), was observed at 4 p. m. on the 11th, in N. 36° 34', W. 19° 20'; the gale began at sse. at noon on the 10th, and shifted to s., s. by w., ssw., sw. by w., and at 6 a. m. on the 11th it fell calm; the wind then shifted to se., ene., ne., n., and nw. Captain Pearson reported: "At 6 a. m. on the 11th it was calm, the wind then came away from se., and freshened as it went around; at noon, ene., force 4; 2 p. m., ne., 6; 4 p. m. (lowest barometer), n., force 7; 8 p. m., wnw., force 8, to nw. by n., force 9, at 10 a. m. on the 12th, and continuing to blow a fresh gale until midnight, when it gradually moderated."

The bark "Francesco," in N. 33° 40', W. 20° 0', on the 11th, encountered a heavy gale from sw. to nw., lasting twenty-four hours; vessel lost and split several sails. The storm continued

to move eastward during the 12th and 13th, with gradually decreasing pressure, and attended by moderate to strong gales over the ocean between the Azores and the tenth meridian west of Greenwich. At 8 a. m. on the 12th the s. s. "Indipendente," P. Pirandello, commanding, in N. 36° 48', W. 16° 10', had barometer 28.87 (733.3), wind blowing a gale of force 11 from n., and shifting to nw., sw., and se. During the 13th the pressure over the ocean between W. 10° and 20° and N. 30° and 40° ranged from 29.3 (744.2) to 29.6 (751.8), and by the following day the low area had apparently entered the continent.

5.—This was a continuation of the area of low pressure described as number v. under "Areas of low pressure." During the 10th it moved from the Gulf of Saint Lawrence over Newfoundland, and on the morning of the 11th it was central off the southeastern coast of that island, where it was probably joined to a cyclonic storm which had apparently moved northeastward from the vicinity of the Bermudas. In connection with the last-mentioned storm, Captain Verries, commanding the s. s. "Neustria," in about N. 36° 30', W. 60° 0', reported: "At about 8 p. m. on November 10th we encountered a heavy gale, which was indicated several hours in advance by the rapid fall that occurred in the barometer, which at 11 p. m. read 29.03 (737.3). The wind, which had remained at southeast during the fall of the barometer, shifted suddenly to sw., w., nw., and n., continuing from the last-mentioned direction while the barometer remained stationary at 29.03 (737.3). As soon as the barometer began to rise, the wind shifted to nw., then to w., and continued to blow with great violence throughout the 11th." The s. s. "Essex," in N. 37°, W. 58°, also encountered a strong w. gale on the 10th, continuing for twenty-four hours, while vessels to the westward of Bermuda had moderate to strong northerly gales.

During the 10th and 11th strong se. to w. gales prevailed over the Banks of Newfoundland and westward to the sixty-fifth meridian, the barometer falling, on the last-mentioned date, to 28.9 (734.0), near N. 45° and between W. 51° 30' and W. 54° 30'. On the 12th and 13th the region of least pressure was shown near N. 52° and between W. 40° and 45°, where the barometer ranged from 29.2 (741.7) to 29.4 (746.7), while sw. to w. gales, of force 8 to 10, prevailed over the ocean southward to the forty-fifth parallel. By the 14th the storm-centre had moved eastward to about N. 51°, W. 32°, with pressure ranging from 29.08 (738.6) to 29.2 (741.7); in the vicinity of the storm-centre the winds, on this date, did not exceed the force of a strong breeze, nor did they anywhere exceed that of a moderate gale, except in the western quadrants, where they occasionally attained a force of 8-9. On the 15th the atmospheric pressure over the ocean between W. 20° and 40°, and from N. 48° to 52°, ranged from 29.0 (736.7) to 29.2 (741.7), and the circulation of the winds indicated the presence of a storm-centre near N. 50°, W. 25°; at the same time the area of low pressure apparently extended southward to, and beyond, the Azores, and within this region moderate to strong gales from s. to w. and nw. were reported. During the 16th, 17th, and 18th this low area was apparently forced to the southeastward, while the barometer was high in the neighborhood of the British Isles; on those dates stormy and unsettled weather prevailed over the ocean from W. 40° eastward to the Bay of Biscay, with strong e. winds to gales near the fiftieth parallel. During this period the pressure over the region above mentioned ranged from 29.14 (740.1) to 29.7 (754.4); and on the 19th the low area apparently occupied the Iberian Peninsula and the Bay of Biscay.

6.—This area of low pressure occupied the Gulf of Saint Lawrence and Newfoundland from the 15th to the 17th, during which period the barometer ranged from 29.25 (742.9) to 29.55 (750.6), and strong westerly breezes to moderate or fresh gales occurred over the region north of 40° N., and from the coast of the United States westward to the Banks of Newfoundland. By the 18th the area of low pressure was shown near N. 51°, W. 41°, with barometer about 29.45 (748.0), and attended by fresh

breezes to moderate gales from s. to sw. and w.; the depression continued its easterly movement north of the fiftieth parallel during the 19th, with slightly decreasing pressure, while the winds, especially in the western quadrants, began to increase in force. On the 20th the storm-centre, which had moved south of east after passing the thirtieth meridian, was shown near N. 51°, W. 20°, where the barometer read 29.2 (741.7) to 29.33 (745.0), and the area of decreasing pressure spread southeastward to the Bay of Biscay; on the 21st the storm-centre was off the southwest coast of Ireland, and the pressure had decreased to 29.0 (736.6). Moderate to strong se. gales prevailed over the British Isles, and se. to sw. gales over the Bay of Biscay. On the 22d this low area was apparently central near the entrance to the English Channel, with barometer about 29.3 (744.2).

7.—This was a continuation of the low area described as number vii under "Areas of low pressure." On the 20th it was central near the southern coast of Newfoundland, with pressure about 29.1 (739.1), and by the following day it had passed eastward to about N. 48°, W. 49°, the barometer near the centre ranging from 29.35 (745.5) to 29.55 (750.6). On the 22d the lowest pressures, 29.19 (741.4) to 29.26 (743.2), were indicated near N. 52°, W. 26°, and in no part of the ocean between Newfoundland and the tenth meridian, and from N. 40° to N. 55°, did the pressure exceed 29.6 (751.8). During the 23d and 24th the low area moved slightly south of east, with the pressure ranging from 29.0 (736.6) to 29.3 (744.2); and on the last-mentioned date it was central south of Ireland. During its passage over the ocean this area of low pressure was attended by strong winds to moderate gales, mostly from the west.

8.—This was probably the most severe storm of the month over the Atlantic Ocean. It was apparently developed over the ocean in the vicinity of Bermuda, prior to the 21st, the date on which it first became well-defined on the chart; on the 19th the s. s. "Bellingham," in N. 34°, W. 58°, had a heavy gale in which she lost yawl-boat and had sails damaged, and on the 20th strong wsw. to wnw. gales were reported near the Bahamas, while moderate to strong gales from n. and ne. were reported by vessels off the coast south of Hatteras. Captain Locke, commanding the s. s. "Muriel," reported: "During the 19th, 20th, and 21st had strong gales from sw. to w., attended by violent rain squalls; at 10 a. m. of the 21st had a very heavy squall, accompanied by hail, thunder, and lightning; some of the hail-stones measured over one inch in size; very heavy sea from sw.; lowest barometer, 29.45 (748.0)." The vessel's position from the 19th to 21st was N. 35° 45', W. 70° 12' to N. 30° 40', W. 67° 12'.

At Bermuda, on the 21st, the barometer read 29.5 (749.3), having fallen steadily since the 19th; wind w., force 6, having shifted from sse., force 6, on the 19th, to sw., force 2, on the 20th; weather unsettled and squally. The s. s. "Manhattan," F. Stevens, commanding, had a whole gale from w. by s. to wnw. from noon of the 19th until the 20th; the lowest barometer was 29.52 (749.8), at 5 p. m. on the 19th. Captain Stevens reports as follows: "Sailed from Turk's Island 1.30 p. m., November 19th; have had strong westerly winds and heavy seas all the passage, with low barometer, standing generally at 29.6 (751.8), heavy westerly sea." On the 21st this cyclone was central to the north or northeast of Bermuda, the lowest pressures, as shown by the observations at hand, ranging from 29.4 (746.7) to 29.5 (749.3). Strong gales from s. prevailed near W. 60°; strong e. to ne. gales north of the fortieth parallel and west of 60° W., while n. to nw. and w. gales occurred between the coast of the United States and Bermuda. On the 22d the storm-centre was near N. 43°, W. 55°; the s. s. "Wyoming," C. L. Rigby, commanding, in N. 44° 8', W. 55° 50', had barometer down to 29.26 (743.2), whole gale from e., shifting to ene., ne., n., and nw.; on the same date the s. s. "St. Laurent," M. de Jousselein, commanding, had barometer 29.37 (746.0), in N. 43° 51', W. 56° 15', fresh gale from ne., shifting to nnw.

During the 22d the cyclone moved northeastward, and on the following date it was central near N. 47°, W. 47°, as shown by the following reports: s. s. "France," A. D. Hadley, commanding, at 1 a. m. on the 23d, in N. 44° 43', W. 49° 52', barometer 28.88 (733.5), whole gale from ssw. to nw. and nne.; s. s. "Lydian Monarch," T. C. Huggett, commanding, in N. 46°, W. 49° 20', barometer 29.0 (736.6), at 4 a. m. on the 23d, whole gale from w. to wnw.; s. s. "Noordland," H. E. Nickles, commanding, in N. 45° 28', W. 49° 50', at 5.40 a. m., barometer 28.86 (733.0), strong gale from sw. by s. to w. and nw.; s. s. "City of Chester," H. Condron, commanding, in N. 46° 40', W. 47° 0', at 10 a. m., barometer 28.88 (733.5), fresh gale from sw. to w., nw., and nne.; s. s. "Edam," J. H. Taat, commanding, in N. 45° 52', W. 49° 20', at 10 a. m., barometer 29.02 (737.1), whole gale from nw., shifting to ne.; s. s. "Jan Breydel," H. Myer, commanding, in N. 45° 15', W. 47° 05', at noon, barometer 28.97 (735.8), gale of force 10 (11 Beaufort scale) from sw. by w., shifting to wnw. On the 24th the region of least pressure was transferred to about N. 49°, W. 35°, the position of the storm-centre being clearly indicated by the well-defined cyclonic action of the winds. At 3 p. m. of the 23d the s. s. "Geiser," F. V. Schierbeck, commanding, in N. 47° 32', W. 45° 23', had barometer 29.0 (736.6), whole gale from ese. to sse. and sw., and thence to wnw; and at midnight of the 23d the s. s. "Germanic," H. Perry, commanding, in N. 48° 29', W. 38° 57', had barometer 28.74 (730.0), wind wsw., force 3, increasing, and veering to nw. until it reached force 9. The s. s. "Lord Clive," P. Urquhart, commanding, in N. 50°, W. 35° 30', at 6 p. m. on the 23d had barometer 29.17 (740.9), wind e., force 2, and at midnight, in N. 49° 40', W. 37° 0', it read 28.9 (734.0). Throughout the 24th and 25th, as the storm-centre moved slowly eastward, the pressure remained below 29.0 (736.6), and heavy nw. and n. gales were reported to the west of the storm-centre, although the winds in the eastern quadrants did not exceed the force of a moderate gale. By the 26th this storm had reached the west coast of Ireland, and the pressure at the storm-centre had fallen to 28.4 (721.3), and strong gales were now prevailing in all quadrants. During the 26th the storm-centre passed over the British Isles.

9.—This was a continuation of the low area described as number viii under "Areas of low pressure." It passed off the coast of the United States on the 25th, and by the 26th the storm-centre was near N. 41°, W. 56°, with lowest reported pressure 29.28 (743.7), with fresh to strong e. to ne. gales over the region between N. 40° and 45° and from W. 55° to 60°. By the 27th the storm-centre had moved northeastward to about N. 50°, W. 37°, where the barometer ranged from 29.0 (736.6) to 29.2 (741.7); moderate w. gales prevailed over the region west of the fortieth meridian, with pressure ranging from 29.3 (744.2) to 29.7 (754.4) between W. 40° and the Banks of Newfoundland. Over the eastern part of the ocean, from about W. 40° eastward to about W. 15°, the pressure ranged from 28.99 (736.3) to 29.24 (742.7), and variable winds, moderate to strong in force, were reported. During the 28th and 29th this low area continued its northeasterly movement, and on the last-mentioned date it was apparently central to the northwest of the British Isles, with pressure near the storm-centre about 29.15 (740.4); during that date the pressure over the ocean between W. 35° and the British Isles, and north of the fiftieth parallel, did not exceed 29.5 (749.3), but on the last day of the month an increase set in and barometer rose to 30.0 (762.0) between W. 40° and 20°, and to 29.6 (751.8) between the last-mentioned meridian and the British Isles.

OCEAN ICE.

The only iceberg reported during the month of November, 1885, was observed in N. 48° 00', W. 51° 10' by Captain Poland, commanding the s. s. "Missouri."

In November, 1884, several icebergs were seen in N. 45° 56', W. 52° 38', but none were reported in that month of the years 1882 and 1883.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York City and Philadelphia, and in the Custom-House, Boston, where the necessary blanks and other information will be furnished to ship-masters.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were cabled to that office from New York during November, 1885, thirteen reports concerning storms encountered by vessels in the Atlantic west of the forty-fifth meridian; one message was sent from Boston.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for November, 1885, is exhibited on chart ii by the dotted isothermal lines; and in the tables of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service.

In the following table are given the mean temperatures for the several geographical districts, with the normals and departures, as deduced from Signal Service observations:

Average temperatures for November.

Districts.	Average for Nov. Signal-Service ob- servations.		Comparison of Nov., 1885, with the average for several years.
	For sev- eral years.	For 1885.	
New England.....	39.6	41.9	+ 2.3
Middle Atlantic States.....	45.3	46.5	+ 1.2
South Atlantic States.....	55.1	54.4	- 0.7
Florida Peninsula.....	68.5	64.9	- 3.6
Eastern Gulf States.....	55.6	54.6	- 1.0
Western Gulf States.....	56.9	58.2	+ 1.3
Rio Grande Valley.....	64.8	67.5	+ 2.8
Tennessee.....	48.2	48.9	+ 0.7
Ohio Valley.....	43.1	46.3	+ 3.2
Lower Lake region.....	38.8	41.0	+ 2.2
Upper Lake region.....	33.9	36.7	+ 2.8
Extreme Northwest.....	24.4	30.5	+ 6.1
Upper Mississippi Valley.....	38.2	41.0	+ 2.8
Missouri Valley.....	33.5	36.4	+ 2.9
Northern slope.....	31.2	40.3	+ 9.1
Middle slope.....	37.7	43.4	+ 5.7
Southern slope.....	48.6	53.4	+ 4.8
Southern plateau.....	48.2	51.8	+ 3.6
Middle plateau.....	37.0	43.0	+ 6.0
Northern plateau.....	37.1	43.6	+ 6.5
North Pacific coast region.....	44.5	46.5	+ 2.0
Middle Pacific coast region.....	52.8	54.3	+ 1.5
South Pacific coast region.....	59.1	60.8	+ 1.7

Over the central Ohio Valley, southwestern Virginia, the east Gulf states, Florida, and in the south Atlantic states, except along the South Carolina coast, the mean temperature for November, 1885, was slightly below the normal, the departures being most marked over the Florida Peninsula, where they were from 3° to 4°. In all other districts the mean temperature was above the average. Along the Pacific coast the departures ranged from 0°.8, at Red Bluff, California, to 2°.1, at Portland, Oregon; over the Rocky Mountain districts the departures generally varied from 4° to 10°, the greatest occurring in Montana; from Louisiana and eastern Texas northward to British America, and from the upper Mississippi Valley eastward to the New England coast, the departures below the normal generally varied from 2° to 4°.

The following are some of the most marked departures from the normal:

Above normal.		Below normal.	
Fort Benton, Montana.....	13.8	Sanford, Florida.....	4.4
Fort Assinaboine, Montana.....	11.8	Cedar Keys, Florida.....	3.2
Fort Shaw, Montana.....	11.1	Key West, Florida.....	3.1
Helena, Montana.....	9.5	Pensacola, Florida.....	2.1
Fort Buford, Dakota.....	9.1	Mobile, Alabama.....	1.8
Deadwood, Dakota.....	8.9	Hatteras, North Carolina.....	1.5
Fort Maginnis, Montana.....	8.2	New Orleans, Louisiana.....	1.2
Fort Custer, Montana.....	7.7	Kitty Hawk, North Carolina.....	1.1
Dayton, Washington Territory.....	7.3	Fort Macon, North Carolina.....	1.0

DEVIATIONS FROM NORMAL TEMPERATURES.

In the table below are given, for certain stations, as reported by voluntary observers, the normal temperatures for November for a series of years, the mean temperature for November, 1885, and the departures from the normal:

Station.	County.	Normal temperature for November.	Number of years.	Mean temperature for Nov., 1885.	Departure.
<i>Arkansas.</i>		0		0	0
Lead Hill.....	Boone.....	47.8	4	49.8	+ 2.0
<i>Connecticut.</i>					
Middletown *.....	Middlesex.....	39.2	27	41.6	+ 2.4
New Haven *.....	New Haven.....	40.3	99	42.4	+ 2.1
<i>California.</i>					
Sacramento.....	Sacramento.....	52.8	19	54.4	+ 1.6
<i>Illinois.</i>					
Anna.....	Union.....	44.3	10	47.8	+ 3.5
Mattoon.....	Coles.....	39.7	5	43.0	+ 3.3
Peoria.....	Peoria.....	39.4	30	42.8	+ 3.4
Riley.....	McHenry.....	33.2	25	35.8	+ 2.6
Sycamore.....	De Kalb.....	36.7	4	36.0	- 0.7
<i>Indiana.</i>					
Lafayette.....	Tippecanoe.....	37.5	6	39.8	+ 2.3
Mauzy.....	Rush.....	37.9	6	37.6	- 0.3
Spiceland.....	Henry.....	38.6	32	42.0	+ 3.4
Vevay.....	Switzerland.....	43.7	21	46.5	+ 2.8
<i>Iowa.</i>					
Cresco.....	Howard.....	28.7	10	32.4	+ 3.7
Monticello.....	Jones.....	33.4	32	35.2	+ 1.8
<i>Kansas.</i>					
Independence.....	Montgomery.....	45.9	14	47.9	+ 2.0
Wellington.....	Sumner.....	40.8	7	45.2	+ 4.4
Yates Centre.....	Woodson.....	37.6	5	48.2	+ 10.6
<i>Maine.</i>					
Gardiner.....	Kennebec.....	35.7	49	38.6	+ 2.9
<i>Maryland.</i>					
Fallston.....	Harford.....	42.2	15	43.7	+ 1.5
<i>Massachusetts.</i>					
Amherst *.....	Hampshire.....	38.1	48	41.7	+ 3.6
Cambridge *.....	Middlesex.....	39.0	63	41.8	+ 2.8
Fitchburg *.....	Worcester.....	36.5	29	38.6	+ 2.1
Lowell *.....	Middlesex.....	38.5	10	41.6	+ 3.1
New Bedford *.....	Bristol.....	41.8	74	44.1	+ 2.3
Springfield *.....	Hampden.....	38.2	18	41.4	+ 3.2
Somerset.....	Bristol.....	39.5	15	44.8	+ 5.3
Williamstown *.....	Berkshire.....	36.9	30	39.0	+ 2.1
Worcester *.....	Worcester.....	39.2	45	39.2	0.0
<i>New Brunswick.</i>					
Saint John *.....	Saint John.....	34.9	25	36.6	+ 1.7
<i>New Hampshire.</i>					
Concord *.....	Merrimac.....	37.4	18	39.5	+ 2.1
Contooscook.....	Merrimac.....	33.5		38.5	+ 5.0
Hanover.....	Grafton.....	33.4	24	34.4	+ 1.0
<i>New York.</i>					
North Volney.....	Oswego.....	35.6	18	39.2	+ 3.6
Palermo.....	Oswego.....	35.5	32	36.7	+ 1.2
Plattsburg Barracks.....	Clinton.....	33.5	16	35.8	+ 2.3
<i>Ohio.</i>					
Wauseon.....	Fulton.....	35.3	15	38.5	+ 3.2
<i>Pennsylvania.</i>					
Dyberry.....	Wayne.....	34.5	18	37.8	+ 3.3
Wellsborough.....	Tioga.....	36.2	7	41.4	+ 3.2
<i>Rhode Island.</i>					
Providence.....	Providence.....	40.0	51	44.0	+ 4.0
<i>South Carolina.</i>					
Stateburg.....	Sumter.....	53.7	5	52.9	+ 0.8
<i>Texas.</i>					
New Ulm.....	Austin.....	59.2	14	61.2	+ 2.0
<i>Vermont.</i>					
Lunenburg *.....	Essex.....	31.1	37	35.6	+ 4.5
Newport *.....	Orlean.....	33.3	10	34.9	+ 1.6
Stratford *.....	Orange.....	33.0	11	34.7	+ 1.7
Woodstock.....	Windsor.....	31.2	18	34.5	+ 3.3
<i>Virginia.</i>					
Bird's Nest.....	Northampton.....	61.9	16	51.9	- 10.0
Dale Enterprise.....	Rockingham.....	43.5	5	45.5	+ 2.0
Variety Mills.....	Nelson.....	44.3	8	43.5	- 0.8
Wytheville.....	Wythe.....	41.9	21	44.9	+ 3.0
<i>West Virginia.</i>					
Helvetia.....	Randolph.....	40.7	9	39.6	- 1.1

* From the "Bulletin of the New England Meteorological Society."

The following notes, on the temperature of the autumn months of 1885, are given by voluntary observers:

Arkansas.—Lead Hill, Boone county: the mean temperature for the autumn of 1885, 58° 6, is 2° 53 below the autumn average for the past four years.

Illinois.—Riley, McHenry county: the mean temperature for autumn of 1885, 46° 8, is 0° 2 below the mean for the past twenty-four autumns.

Iowa.—Monticello, Jones county: the maximum temperature for November for a period of thirty-two years was 70° 0, in 1854, 1859, and 1879, and the minimum for the same period was -11° 0, in 1863 and 1871.

Kansas.—Yates Centre, Woodson county: this has been the

warmest November on record; the autumn temperature for 1885 is 54° 8, being the coldest since 1880.

Maryland.—Fallston, Harford county: highest mean temperature for November for a period of fifteen years, 46° 1, occurred in 1881; lowest, 37° 5, in 1873.

New Jersey.—South Orange, Essex county: November, 1885, has been warmer than for any corresponding month in fifteen years.

New York.—North Volney, Oswego county: the coldest November for a period of eighteen years occurred in 1873, when the mean temperature was 29° 5; the warmest November was in 1877, the mean being 38° 7.

Palermo, Oswego county: the highest November mean for the last thirty-two years was 41° 5, in 1859, and the lowest, 26° 8, in 1873; the mean temperature for autumn, 1885, was 44° 0, which is 1° 5 below the average for thirty-two years.

Ohio.—Wauseon, Fulton county: the highest November mean temperature for a period of fifteen years was in 1883, being 40° 3, and the lowest, 27° 9, in 1880; the extremes for the same period were, maximum, 74° 6, in November, 1876 and 1882, and minimum, -8° 5, in 1880.

Texas.—New Ulm, Austin county: the mean temperature for November, 1885, 61° 2, is 2° 0 above the average for the last fourteen years; the highest November mean was 65° 6, in 1879, and the lowest, 49° 6, in 1880. The maximum temperature in any November during this period was 94° 0, in 1882, and the minimum, 16°, in 1872.

Vermont.—Woodstock, Windsor county: highest November mean for a period of eighteen years, 36° 6, in 1877; lowest, 22° 5, in 1873; the maximum temperature was 73° 2, in 1876, and the minimum, -16° 5, in 1875.

Virginia.—Variety Mills, Nelson county: the mean temperature for autumn, 1885, is 53° 6, or 3° 0 below the average for eight years; during this period the highest mean temperature was 61° 5, in 1881, and the lowest, 53° 4, in 1880.

RANGES OF TEMPERATURE.

The monthly, and the greatest and least daily ranges of temperature, are given in the tables of miscellaneous meteorological data.

The monthly ranges were greatest over the middle and southern plateau districts and thence eastward to the Mississippi River, where they generally exceeded 50°; they were least on the north and middle Pacific coasts and in southern Florida, the ranges varying from 16° 4 to 29°.

The following are some of the greatest and least monthly ranges:

Greatest.	Least.
Phoenix, Arizona.....	0
Fort Canby, Washington Territory.....	16.4
Tatoosh Island, Washington Territory.....	18.7
San Francisco, California.....	20.0
Astoria, Oregon.....	26.0
Pysht, Washington Territory.....	26.0
Key West, Florida.....	27.8
Olympia, Washington Territory.....	28.4
Port Angeles, Washington Territory.....	29.0
Lamar, Missouri.....	58.4
West Las Animas, Colorado.....	59.5
Fort Sill, Indian Territory.....	59.0
Fort Supply, Indian Territory.....	60.0
Lava, New Mexico.....	60.2
Fort Elliott, Texas.....	62.4
Denver, Colorado.....	63.8
Phoenix, Arizona.....	65.0

FROSTS.

Frosts occurred in the various districts on the following dates:

New England.—1st, 2d, 4th, 10th, 11th, 12th, 14th to 18th, 20th to 24th, 26th to 30th.

Middle Atlantic states.—1st to 30th.

South Atlantic states.—1st to 4th, 9th, 10th, 11th, 14th to 22d, 24th to 28th.

Florida Peninsula.—Fort Meade, 15th; Archer, 15th, 16th, 17th, 21st, 25th, 26th, 27th; Limona, 15th, 26th, 27th; Manatee, 25th, 26th; Sanford, 25th, 26th, 27th.

East Gulf states.—2d, 3d, 8th to 11th, 14th to 21st, 23d to 27th.

West Gulf states.—2d, 8th, 9th, 13th to 16th, 19th, 20th, 23d to 26th, 28th, 29th, 30th.

Table of comparative maximum and minimum temperatures for November.

State or Territory.	Station.	For 1885.		Since establishment of station.			
		Max.	Min.	Max.	Year.	Min.	Year.
Alabama	Mobile	76.4	33.3	82.0	1878, 1881	27.0	'71, '76, '80
Do	Montgomery	79.3	31.0	83.0	1879, 1882	21.0	1872
Arizona	Prescott	75.0	20.8	75.0	1876	-1.0	1880
Do	Yuma	86.4	41.1	91.0	1879	31.0	1880
Arkansas	Fort Smith	79.9	23.1	86.0	1882	22.0	1882
Do	Little Rock	79.0	25.2	82.0	1879	10.0	1880
California	San Francisco	70.0	50.0	78.0	1871	41.0	1880
Do	San Diego	76.4	41.5	85.0	1873	38.0	1881
Colorado	Denver	75.0	11.2	76.0	1876, 1879	-18.0	1877
Do	Pike's Peak	33.2	-9.0	33.0	1878, 1879	-38.0	1880
Connecticut	New Haven	64.8	19.1	71.3	1882	2.0	1875
Do	New London			72.0	1882	4.0	1875
Dakota	Fort Buford	58.0	11.9	62.0	1879	-20.0	1881
Do	Yankton	67.5	18.4	76.0	1870	-15.0	1875
Delaware	Del. Breakwater			73.0	1881	23.0	1880
Do	Cape Henlopen	72.0	27.1				
District of Columbia	Washington City	71.0	29.7	80.0	1879	12.5	1880
Florida	Jacksonville	81.2	30.4	84.0	1875, 1877	30.0	1873
Do	Key West	84.0	50.2	91.0	1870	52.0	1873
Georgia	Augusta	84.9	28.2	83.0	1882	24.0	1873
Do	Savannah	79.5	35.0	82.0	1875	22.0	1872
Idaho	Boise City			59.0	1879	-7.3	1884
Do	Lewiston	61.8	29.3	63.2	1881	13.0	1880
Illinois	Chicago	75.6	27.7	80.5	1882	7.0	1872
Do	Indianapolis	66.0	27.6	68.0	1875	-23.0	1872
Indiana	Greencastle	69.8	23.7	75.0	1879	-5.0	1880
Do	Fort Mill	68.9	25.9	66.1	1884	9.7	1884
Indian Territory	Fort Sill	84.0	25.0	83.0	1879	-4.0	1880
Iowa	Des Moines	66.3	21.4	71.0	1874, 1879	-3.0	1875
Do	Keokuk	73.2	23.1	74.0	1874	-3.0	1872
Kansas	Dodge City	75.5	21.2	83.0	1875	-7.0	1880
Do	Leavenworth	75.5	26.0	77.0	1874	0.0	1872
Kentucky	Louisville	72.7	34.0	78.0	1879	4.5	1874
Louisiana	New Orleans	84.7	40.0	82.0	1881	31.5	1881
Do	Shreveport	80.8	31.6	86.0	1882	18.0	1880
Maine	Eastport	57.1	24.2	64.0	1882	-13.0	1875
Do	Portland	55.5	19.9	66.0	1882	-6.0	1875
Maryland	Baltimore	73.5	32.5	78.0	1879	15.0	1880
Massachusetts	Boston	68.8	23.3	75.0	1870	-2.0	1875
Michigan	Alpena	64.2	22.1	63.0	1874	-4.0	1880
Do	Detroit	67.1	28.9	69.0	1879, 1882	0.0	1880
Minnesota	Saint Paul	52.7	17.2	72.0	1874	-24.5	1875
Do	Saint Vincent	40.2	0.7	58.7	1884	-22.0	1880, 1883
Mississippi	Vicksburg	84.8	31.2	84.5	1882	23.0	1877, 1880
Missouri	Saint Louis	76.1	31.8	82.0	1879	8.0	1880
Montana	Fort Benton	68.0	15.9	71.6	1884	-31.0	1875
Do	Helena	60.9	19.8	62.0	1884	-17.0	1880, 1881
Nebraska	Omaha	63.1	21.5	73.8	1882	-6.0	1875
Do	North Platte	63.0	24.3	79.0	1871	-10.0	1877
Nevada	Winnemucca	64.8	13.0	67.0	1879	-9.0	1880
New Hampshire	Mount Washington	51.0	5.8	47.0	1880	-40.0	1875
New Jersey	Atlantic City	64.7	26.8	72.0	1882	10.0	1875
Do	Sandy Hook	72.0	29.9	73.0	1881	6.0	1880
New Mexico	Santa Fé	62.0	20.0	77.0	1878	-11.0	1880
New York	Buffalo	67.5	27.6	68.3	1881	2.5	1875
Do	New York City	68.0	25.0	74.0	1882	7.0	1875
North Carolina	Charlotte	75.7	27.7	80.0	1879	18.0	1880
Do	Wilmington			83.0	1877, 1879	20.0	1872
Ohio	Cleveland	68.3	22.1	72.5	1882	0.0	1880
Do	Cincinnati	70.8	27.1	75.0	1879	5.0	1880
Oregon	Portland	65.0	34.0	68.0	1873	22.5	1880
Do	Roseburg			69.7	1884	17.5	1880
Pennsylvania	Philadelphia	71.0	28.8	77.0	1876	8.0	1875
Do	Pittsburg	72.0	21.1	79.0	1876	4.0	1880
Rhode Island	Block Island						
Do	Newport			71.2	1882	4.0	1875
South Carolina	Charleston	78.4	34.0	82.0	1879	28.0	1873, 1881
Tennessee	Knoxville	73.5	29.3	80.5	1881	11.5	1872
Do	Nashville	72.3	30.0	78.0	1879	13.0	1872
Texas	Galveston	80.3	46.4	82.0	1870	29.0	1880
Do	El Paso	78.3	23.3	82.0	1882	11.0	1880
Utah	Salt Lake City	68.9	17.0	68.0	1875	3.0	1880
Vermont	Burlington			65.8	1882	1.0	1873
Virginia	Lynchburg	71.6	28.3	80.2	1882	13.0	1880
Do	Norfolk	78.1	35.4	79.2	1883	20.0	1872
Washington Ter.	Dayton	77.2	27.3	66.0	1883	5.0	1881
Do	Olympia	59.2	30.8	63.0	1884	21.0	1882
West Virginia	Morgantown			70.0	1881	8.0	1880
Wisconsin	La Crosse	58.0	20.8	70.0	1874	-21.0	1875
Do	Milwaukee			70.0	1874	-14.0	1875
Wyoming	Cheyenne	67.1	15.9	69.0	1870	-20.0	1875

Rio Grande Valley.—Brownsville and Rio Grande City, Texas, 14th.

Tennessee.—2d, 3d, 4th, 9th, 10th, 11th, 13th to 17th, 20th, 21st, 24th, 26th, 27th, 29th.

Ohio Valley.—1st to 4th, 8th to 11th, 13th to 18th, 20th to 30th.

Lower lake region.—1st, 4th, 7th, 8th, 11th, 13th to 17th, 19th to 30th.

Upper lake region.—1st to 30th.

Extreme northwest.—1st to 6th, 8th to 28th, 30th.

Upper Mississippi Valley.—1st to 6th, 8th to 17th, 19th to 30th.

Missouri Valley.—1st to 30th.

Northern slope.—1st to 30th.

Middle slope.—1st to 30th.

Southern slope.—1st, 2d, 10th, 13th, 14th, 16th, 19th, 23d, 24th, 25th, 27th to 30th.

Southern plateau.—4th, 6th, 7th, 8th, 12th to 15th, 17th, 18th, 21st to 30th.

Middle plateau.—1st to 15th, 17th to 28th, 30th.

Northern plateau.—1st, 3d, 4th, 5th, 11th to 16th, 19th, 21st, 22d, 26th, 29th.

North Pacific coast region.—1st to 4th, 6th, 7th, 10th to 15th, 18th to 22d, 26th, 28th.

Middle Pacific coast region.—3d, 5th, 11th to 14th.

South Pacific coast region.—Los Angeles, 12th, 15th.

ICE.

Ice formed in the southern parts of the country as follows:

Alabama.—Greensborough, 14th, 24th, 25th, 26th.

Arkansas.—Lead Hill, 2d, 8th, 13th, 15th, 20th, 25th, 26th; Little Rock, 14th.

California.—Murieta, 2d.

Georgia.—Forsyth, 13th, 14th, 24th, 25th, 26th; Augusta, 3d; Savannah, 25th.

New Jersey.—Clayton, 1st, 14th, 16th, 17th, 20th, 21st, 22d, 28th, 29th; Little Egg Harbor, 28th.

North Carolina.—Weldon, 1st; Raleigh, 26th; Lenoir, 27th; New River Inlet, 4th.

South Carolina.—Stateburg, 3d, 26th; Spartanburg, 25th.

Tennessee.—Ashwood, 3d, 15th, 16th, 25th, 26th, 27th; Nashville, 15th, 26th.

Texas.—Cleburne, 29th; Comfort, 13th, 14th, 28th; Fort Concho, 13th.

Virginia.—Bird's Nest, 1st, 4th, 15th, 17th, 21st.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada for November, 1885, as determined from reports from more than seven hundred stations, is exhibited on chart iii.

In South Carolina, Georgia, and Florida the rainfall has been decidedly below the average, the departures ranging from about 1.50 to 2.50 at all stations, except at Atlanta, Georgia, and Sanford, Florida, where they are 0.69 and 0.61, respectively. There is also an area of deficiency which extends along the northern border of the country from northern New England to Dakota (except over the northern Michigan peninsula, where the rainfall was excessive) in a southwesterly direction to the west Gulf states and Rio Grande Valley. Over the greater part of this extensive area the deficiency exceeded 1.00, and over portions of Illinois, Iowa, Arkansas, Louisiana, and Texas it amounted to more than 2.00. From North Carolina and eastern Tennessee northeastward to southern New England, and in portions of the lower lake region, Ohio Valley, and east Gulf states, the rainfall has been in excess of the average, the departures being most marked over eastern Tennessee, the central Ohio Valley, northeastern Ohio, and at stations along the coasts of New Jersey and North Carolina. In the Rocky Mountain districts and in the Pacific coast regions the rainfall was also above the November average. On the Pacific coast the rainfall was remarkably heavy, numerous stations reporting from ten to nineteen inches. At Red Bluff, California, the amount was 17.05, the average for November during the eight preceding years being 2.20. At Sacramento and San Francisco, California, the departures were also very marked, amounting to 10.17 and 9.26, respectively, and the rainfall at these stations was the largest recorded for any corresponding month since their establishment. At Los Angeles, California, the rainfall was 5.55, or 4.50 above the November average for the last eight years, the aggregate rainfall for November during that period being 7.72, or only 2.17 in excess of that for November, 1885.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows, for certain stations, as reported

by voluntary observers, the average precipitation for the month of November for a series of years; the precipitation for November, 1885; and the departures from the average:

Station.	County.	Average pre- cipitation for Nov.	Number of years.	Precipitation for Novem- ber, 1885.	Departure.
		Inches.		Inches.	Inches.
Arkansas.					
Lead Hill.....	Boone.....	4.47	4	3.50	-1.97
California.					
Sacramento.....	Sacramento.....	2.42	11	9.65	+7.23
Connecticut.					
Hartford.....	Hartford.....	3.23	13	5.02	+1.79
Middletown.....	Middlesex.....	3.91	27	4.94	+1.03
Wallingford.....	New Haven.....	3.87	27	5.05	+1.18
Illinois.					
Anna.....	Union.....	4.42	10	1.80	-2.62
Mattoon.....	Coles.....	3.78	5	2.20	-1.58
Peoria.....	Peoria.....	2.37	30	1.04	-1.33
Riley.....	McHenry.....	2.02	25	2.09	+0.07
Sycamore.....	De Kalb.....	3.74	4	2.06	-1.68
Indiana.					
Mauzy.....	Rush.....	3.60	6	2.35	-1.25
Spiceland.....	Henry.....	3.00	25	1.80	-1.20
Vevay.....	Switzerland.....	3.16	21	2.46	-0.70
Iowa.					
Cresco.....	Howard.....	1.68	10	0.39	-1.29
Monticello.....	Jones.....	2.46	32	0.61	-1.85
Kansas.					
Independence.....	Montgomery.....	2.07	13	0.58	-1.49
Wellington.....	Sumner.....	1.20	7	1.02	-0.18
Yates Centre.....	Woodson.....	1.96	5	0.85	-1.12
Maine.					
Gardiner.....	Kennebec.....	4.28	47	2.86	-1.42
Maryland.					
Fallston.....	Harford.....	3.52	15	4.68	+1.16
Massachusetts.					
Amherst.....	Hampshire.....	3.78	51	5.65	+1.87
Cambridge.....	Middlesex.....	3.92	45	6.12	+2.20
Fitchburg.....	Worcester.....	3.06	21	5.61	+2.55
Framingham.....	Middlesex.....	3.93	11	5.98	+2.05
Lake Cochituate.....	Middlesex.....	4.53	34	6.11	+1.58
Lowell.....	Middlesex.....	3.86	61	4.84	+0.98
New Bedford.....	Bristol.....	4.30	73	3.16	-1.14
Springfield.....	Hampden.....	3.83	38	5.91	+2.08
Somerset.....	Bristol.....	4.45	15	3.00	-1.45
Williamstown.....	Berkshire.....	2.61	18	3.97	+1.36
Worcester.....	Worcester.....	3.53	44	5.96	+2.43
New Brunswick.					
Saint John.....	Saint John.....	5.63	25	5.77	+0.14
New Hampshire.					
Concord.....	Merrimac.....	2.97	30	3.74	+0.77
Contoosook.....	Merrimac.....	3.25	18	5.40	+2.15
Hanover.....	Grafton.....	2.26	18	4.62	+2.36
New Jersey.					
South Orange.....	Essex.....	3.40	16	4.10	+0.70
New York.					
North Volney.....	Oswego.....	3.56	14	2.95	-0.61
Palermo.....	Oswego.....	3.71	32	2.50	-1.21
Plattsburg Barracks.....	Clinton.....	1.92	16	4.39	+2.47
Ohio.					
Wauseon.....	Fulton.....	3.11	13	2.73	-0.38
Oregon.					
Bandon.....	Coos.....	4.56	7	18.21	+13.65
Pennsylvania.					
Dyberry.....	Wayne.....	2.89	14	4.41	+1.52
Rhode Island.					
Providence.....	Providence.....	4.16	54	3.59	-0.57
South Carolina.					
Stateburg.....	Sumter.....	2.87	5	1.45	-1.42
Texas.					
New Ulm.....	Austin.....	5.69	14	0.89	-4.80
Vermont.					
Lunenburg.....	Essex.....	3.23	38	2.55	-0.68
Newport.....	Orleans.....	3.24	10	3.97	+0.73
Stratford.....	Orange.....	3.46	11	4.30	+0.84
Woodstock.....	Windsor.....	3.12	17	4.53	+1.41
Virginia.					
Bird's Nest.....	Northampton.....	2.23	16	5.80	+3.57
Dale Enterprise.....	Rockingham.....	1.75	5	4.05	+2.30
Variety Mills.....	Nelson.....	2.08	7	2.85	+0.77
Wytheville.....	Wythe.....	2.62	21	2.56	-0.06
West Virginia.					
Helvetia.....	Randolph.....	4.38	9	4.06	-0.32

* From the "Bulletin of the New England Meteorological Society."

The following notes, in connection with this subject, are reported by voluntary observers:

Arkansas.—Lead Hill, Boone county: the rainfall for autumn, 1885, has only amounted to 7.36, being 9.10 below the autumn average for the past four years.

California.—Princeton, Colusa county: the rainfall for November, 7.21, is the largest ever recorded for that month at this place.

Illinois.—Riley, McHenry county: the total precipitation, 8.52, for autumn of 1885, is 0.09 less than the normal for twenty-four autumns.

Iowa.—Monticello, Jones county: the maximum precipitation for November for the last thirty-two years occurred in 1879, amounting to 5.29, and the minimum, 0.61, in 1885.

Kansas.—Yates Centre, Woodson county: the rainfall for autumn, 1885, is 10.83, or 1.44 above the normal for the past five years.

Maryland.—Fallston, Harford county: greatest precipitation for November for a period of fifteen years, 10.27, in 1877; least, 0.45, in 1882.

New Jersey.—South Orange, Essex county: the precipitation for November, 4.10, was only exceeded in 1878.

Moorestown: the mean precipitation for the three autumn months, 7.82, is 2.66 less than the mean for twenty years.

New York.—North Volney, Oswego county: the precipitation for November, 2.95, is 0.61 below the mean for fourteen years, the extremes being 5.65, in November, 1880, and 1.45 in November, 1882.

Palermo, Oswego county: the precipitation for autumn, 1885, is 9.62; the extremes for a period of twenty-five years being 18.20 for the autumn of 1866, and 3.10 for the autumn of 1882.

Ohio.—Wauseon, Fulton county: the precipitation for November is 0.38 below the average for thirteen years; the extremes for this period being 5.83, in November, 1881, and 1.46, in November, 1884.

Oregon.—Bandon, Coos county: the rainfall this month, 18.21, was unprecedented; the highest recorded for any November for the past seven years being 7.73, in 1879.

Texas.—New Ulm, Austin county: the precipitation for November, 0.89, is 4.80 below the average for fourteen years; the extremes being 14.93 and 0.78.

Vermont.—Woodstock, Windsor county: the rainfall for November, 4.53, is 1.41 above the mean for seventeen years; the largest rainfall in that period was 4.95, in November, 1877, and the smallest, 0.61, in 1882.

Virginia.—Wytheville, Wythe county: the rainfall for the year is still deficient, being 6.82 below the amount due to date.

In the following table are shown, for the several geographical districts, the normal November precipitation for a series of years; the average for November, 1885, and the excess or deficiency as compared with the normal:

Average precipitation for November.

Districts.	Average for Novem- ber, Signal-Service observations.		Comparison of Nov., 1885, with the aver- age for several years.
	For sev- eral years.	For 1885.	
	Inches.	Inches.	Inches.
New England.....	4.49	4.07	-0.42
Middle Atlantic States.....	3.08	4.64	+1.56
South Atlantic States.....	3.92	2.88	-1.04
Florida Peninsula.....	2.09	0.63	-1.46
Eastern Gulf States.....	4.70	5.19	+0.49
Western Gulf States.....	4.61	2.55	-2.06
Rio Grande Valley.....	1.70	0.16	-1.54
Tennessee.....	4.30	4.58	+0.28
Ohio Valley.....	3.40	3.28	-0.12
Lower lake region.....	3.16	3.18	+0.02
Upper lake region.....	2.78	2.47	-0.31
Extreme northwest.....	0.78	0.78	0.00
Upper Mississippi Valley.....	2.62	1.16	-1.46
Missouri Valley.....	0.87	1.28	+0.41
Northern slope.....	0.64	0.64	0.00
Middle slope.....	0.96	0.87	-0.09
Southern slope.....	1.28	0.64	-0.64
Southern plateau.....	0.53	1.23	+0.70
Middle plateau.....	0.98	3.44	+2.46
Northern plateau.....	1.92	3.59	+1.67
North Pacific coast region.....	7.20	9.35	+2.15
Middle Pacific coast region.....	1.82	11.88	+10.06
South Pacific coast region.....	0.55	2.94	+2.39

SNOW.

The dates on which snow fell in the various districts are as follows:

New England.—2d, 3d, 4th, 9th, 10th, 15th, 18th, 19th, 21st to 26th, 29th, 30th.

Middle Atlantic states.—1st, 2d, 3d, 14th, 15th, 16th, 19th, 21st to 27th, 29th.

South Atlantic states.—20th, 23d, 24th, 25th.

East Gulf states.—Atlanta, Georgia, 25th.

Tennessee.—24th, 25th.

Table of excessive and greatest monthly precipitation for November, 1885.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.			Date.	Amt.	
Alabama.				Louisiana—Cont'd			
Marion.....	6, 7	7.00	7.90	Point Pleasant...	26	2.02	
Greensborough....	6, 7	6.00	7.32	Luling.....	5, 6	4.00	
Mt. Vernon B'cks.	7	3.70		Shreveport.....	4	2.44	
Auburn.....	7	2.29		Maine.			
Centre.....	7	2.00		Orono.....	9	2.68	
Florence.....	6	3.31		Maryland.			
Gadsden.....	6, 7	3.50		Woodstock.....	7, 8	2.34	
Mount View.....	6	2.25		Massachusetts.			
Prattville.....	7	2.00		Cambridge b.....			9.20
Tuscaloosa.....	6, 7	3.86		Northampton.....			6.99
Tusculum.....	6, 7	2.33		Princeton.....	9	2.63	
Arkansas.				Chicopee.....			6.66
Mount Ida.....	4, 5	3.05		Newburyport.....			6.59
California.				Chestnut Hill.....			6.42
Delta.....			29.31	Mystic Lake.....			6.34
Fort Gaston.....	1 to 9	13.39	24.54	Milrose.....			6.33
Do.....	28, 29	4.03		Winchester.....			6.28
Emigrant Gap.....			18.69	Waltham.....			6.24
Hydesville.....	7, 8, 9	3.89	18.37	Westborough.....			6.14
Do.....	17	2.00		Medford.....			6.13
Do.....	24, 25	2.30		Holyoke.....			6.13
Do.....	28, 29	2.52		Leicester.....			6.13
Red Bluff.....	16, 17	3.52	17.95	Beverly Farm.....			6.12
Do.....	24	2.32		Cambridge a.....			6.12
Cisco.....			17.95	Milton.....	2	2.00	6.10
Callistoga.....			15.67	Do.....	20	3.07	
Colfax.....			15.48	Deerfield.....	1, 2	2.65	6.09
San Rafael.....	10	2.20	15.24	Mystic Station.....			6.00
Do.....	15, 16	3.83		Boston.....	24, 25, 26	2.86	
Do.....	24, 25	2.59		Amherst a.....	1, 2	2.08	
Auburn.....			15.24	Do.....	6 to 9	2.80	
Towles.....			14.40	Rowe.....	1, 2	2.30	
Summit.....			13.60	Amherst b.....	6 to 9	2.93	
San Luis Obispo.....	17, 18	10.04	12.90	Missouri.			
Redding.....			11.90	Pierce City.....	5, 6	2.00	
San Francisco.....	24	2.58	11.78	Nevada.			
Angel Island.....	16, 17	2.57	11.57	Carson City.....	17, 18	3.21	
Do.....	24	2.64		New Hampshire.			
Sacramento.....	15 to 18	6.40	11.34	Mt. Washington.....			6.67
Petaluma.....			11.33	Antrim.....	2	2.00	6.50
Oroville.....	16 to 19	4.34	11.27	Wolfborough.....			6.49
Do.....	24	2.34		New Jersey.			
Oakland.....	15, 16, 17	3.10	11.11	Dover.....	5, 9	3.60	7.90
Do.....	24	3.04		Do.....	24	2.10	
Aptos.....			10.65	Atlantic City.....	8, 9	3.88	6.84
Dunnigan.....			10.47	Little Egg Harb.....	8, 9	2.08	6.05
Tehama.....			10.42	Do.....	23, 24	2.02	
Suisun.....			10.38	New York.			
Santa Cruz.....			10.25	Setauket.....	2	3.80	8.16
Alcatraz Island.....	15, 16, 17	2.76	10.04	Do.....	23, 24	2.55	
Orland.....			9.41	Mountainville.....	1, 2	2.03	6.22
New Hall.....			9.01	Do.....	8, 9	2.00	
Chico.....			8.99	North Volney.....	18, 19	2.20	
College City.....	16, 17	2.50	8.85	North Carolina.			
Niles.....			8.78	Reidsville.....	7, 8	5.00	8.40
Benicia Barracks.....			8.75	Do.....	28, 29	3.30	
Borden.....			8.69	Lincolnton.....			6.29
Fort Bidwell.....			8.62	Lenoir.....	5 to 8	4.30	
Napa.....			8.51	Statesville.....	6, 7	3.00	
Ione.....			8.45	Oregon.			
Marysville.....			8.23	Bandon.....	1 to 6	6.73	18.21
Lemoore.....			8.16	Do.....	8, 9	4.73	
Martinez.....			8.08	Do.....	23, 24	2.59	
Knight's Landing.....			8.00	Astoria.....			12.45
San Fernando.....			7.94	Portland.....	7	3.10	8.52
Fresno.....			7.92	Albany.....	3 to 6	4.51	8.40
Pajaro.....			7.91	Ashland.....	7, 8	3.07	8.02
Davisville.....			7.87	Eola.....			7.36
South Vallejo.....			7.87	Fort Klamath.....			7.29
Brighton.....			7.76	Pennsylvania.			
Cahuenga Valley.....	19	2.66	7.39	Mahanoy Plane.....	1, 2	2.12	6.78
Cape Mendocino.....			7.34	Catawissa.....	23, 24	2.36	
Pleasanton.....			7.33	Rhode Island.			
Willows.....			7.28	Block Island.....	23, 24	2.64	
Santa Monica.....			7.20	South Carolina.			
Farmington.....			6.95	Spartanburg.....	6	2.00	
Truckee.....			6.95	Tennessee.			
Chualar.....			6.90	Andersonville.....	7	3.00	6.75
San Mateo.....			6.88	Chattanooga.....	6, 7	3.54	6.18
Gilroy.....			6.77	Knoxville.....	6, 7	3.93	6.15
Byron.....			6.70	Caryville.....	7	3.12	
Monterey.....			6.65	Parksville.....	7	2.07	
Turlock.....			6.63	Grief.....	7	3.28	
Salinas.....	17, 18	2.80	6.60	Farmingdale.....	7	3.17	
Williams.....			6.51	Portola.....	5, 6	4.00	
Lathrop.....			6.46	Cookville.....	6, 7	2.03	
Athol.....			6.43	Clements ville.....	6	2.00	
Brentwood.....			6.40	Manchester.....	6	2.40	
Menlo Park.....			6.22	Beech Grove.....	6, 7	2.11	
Salida.....			6.22	Riddleton.....	6, 7	2.88	
Livermore.....			6.20	Florence Station.....	6, 7	2.01	
Connecticut.				Hohenwald.....	5, 6	2.32	
Shelton.....			6.73	Waynesborough.....	7	2.20	
Bethel.....	1, 2, 3	3.25	6.50	Lexington.....	5, 6	2.00	
Collinsville.....			6.41	Texas.			
Dakota.				Palestine.....	3, 4	2.60	
Yankton.....	5, 6	2.18		Indianola.....	26, 27	2.64	
Florida.				Vermont.			
Penacola.....	5 to 8	7.53	11.07	Townshend.....			7.24
Do.....	27, 28	3.21		Jacksonville.....			6.16
Tallahassee.....	23	3.00		Brattleborough.....	3	2.04	
Kentucky.				Virginia.			
Louisville.....			6.17	Chincoteague.....	8	2.39	6.95
Louisiana.				Do.....	29, 30	2.22	
Point Pleasant.....	6, 7	3.10	6.97	Fort Monroe.....	8, 9	2.30	

Table of excessive and greatest monthly precipitation for November, 1885—Con.

Station.	Specially heavy.		Largest monthly.	Station.	Specially heavy.		Largest monthly.
	Date.	Amt.			Date.	Amt.	
Virginia—Cont'd				Wash. Ter.—Con.			
Dale Enterprise.....	7, 8	3.00		Fort Canby.....	8, 9	2.31	13.72
Washington Ter.....				Pysht.....	7	2.44	13.07
Neah Bay.....	1 to 7	6.90	19.60	Do.....	13	2.63	
Do.....	11 to 14	4.90		Olympia.....	4, 5	3.12	10.18
Tatoosh Island.....	7, 8	2.86	19.25	Tacoma.....	5, 6, 7	3.33	8.22

Ohio Valley.—1st to 4th, 14th, 15th, 21st to 28th.

Lower lake region.—1st to 4th, 14th, 15th, 16th, 18th, 19th, 21st to 28th.

Upper lake region.—1st to 8th, 10th to 16th, 20th to 30th.

Extreme northwest.—1st, 3d to 9th, 11th to 14th, 18th, 19th, 20th, 24th, 28th, 29th, 30th.

Upper Mississippi Valley.—1st, 7th, 12th, 13th, 23d, 24th, 27th, 29th, 30th.

Missouri Valley.—5th, 6th, 7th, 11th, 12th, 18th, 19th, 27th, 29th, 30th.

Northern slope.—4th, 5th, 6th, 10th, 11th, 23d, 25th, 26th, 29th.

Middle slope.—4th, 5th, 6th, 11th, 12th, 25th to 28th.

Southern plateau.—Santa Fé, 5th, 20th, 26th; Fort Wingate, 26th.

Middle plateau.—4th to 7th, 10th, 11th, 12th, 16th, 20th, 23d, 25th, 26th, 29th.

Northern plateau.—Fort Spokane, Washington Territory, 5th, 6th; Spokane Falls, Washington Territory, 6th.

North Pacific coast region.—1st to 7th, 9th, 21st to 26th.

Middle Pacific coast region.—1st, 2d, 4th, 5th, 6th, 11th, 23d, 27th, 28th, 29th.

South Pacific coast region.—Los Angeles, California, 23d, 30th.

LARGEST MONTHLY SNOWFALLS.

Monthly snowfalls of two inches or more were reported from the various states and territories during the month, as follows:

California.—Summit, 136; Cisco, 76.5; Emigrant Gap, 36; Truckee, 34; Boca, 13; Susanville, 3.

Colorado.—Pike's Peak, 6.4; West Las Animas, 2.5.

Connecticut.—North Colebrook, 13; Bethel, 12; Norfolk, 10; Hartford, 7; Collinsville, 6.5; Wallingford, 5.

Dakota.—Webster, 8.7; Fort Bennett, 8.5; Fort Totten, 8.4; Bismarck, 6.4; Deadwood and Fort Buford, 4.7.

Indiana.—Logansport, 3; La Grange, 2.5.

Maine.—Portland, 8; Bridgeton, 6.5.

Maryland.—Woodstock, 2.

Massachusetts.—Rowe, 12.5; Fitchburg b, 10.5; Concord, 10.2; Leominster and Gilbertville, 9; Worcester, 8.4; Princeton, 8; Lawrence, 7; Fitchburg a, 6; Lowell and Westvale, 5.5; Northfield, 5.3; Beverly, 5.2; Newburyport, 4.5; Dudley, Leicester, and Westborough, 4; Springfield, 3.5; Fall River, 3; Blue Hill, Granton, Milton, and Taunton, 2.

Michigan.—Traverse City, 11.5; Alpena, 8.2; Mackinaw City, 6.5; Manistique, 6; Marquette, 5.8; Harrisonville, 4.8; Lansing, 4.1; Escanaba, 3.6; Port Huron, 3.1; Thornville and Hudson, 2.5.

Minnesota.—Saint Vincent, 12.9; Duluth, 6.8; Moorhead, 4.3.

Nebraska.—North Platte, 4.2.

Nevada.—Carson City and Toano, 9.5; Halleck, 5.5; Carlin and Elko, 3; Reno, 2.5; Palisade and Tacoma, 2.

New Hampshire.—Hanover, 17; Mount Washington, 11; Antrim, 9; Warner, 8.5; Concord, 6.2; Nashua, 6; Walpole, 5.5; Manchester a, 4; Manchester b, 3.2.

New Jersey.—Dover, 6; Readington, 2.

New York.—Mountainville, 24; Humphrey, 23; Ithaca, 18.8; Factoryville, 15; Syracuse, 14; Penn Yan and Oswego, 8.5; Rochester, 8.2; Palermo, 6; Albany, 5.9; Buffalo, 5.4; Auburn, Cooperstown, and Menand Station, 5; White Plains, 2.

Ohio.—New Alexandria, 11.5; Hiram, 10; Cleveland, 9; Ruggles, 8; Granville, 6; Garrettsville, 5.8; McConnellsville and Sidney, 5.5; Dayton, North Lewisburg, and Oberlin, 5;

Yellow Springs, 4.5; Jacksonborough, 3.5; Upper Sandusky, 2.8; New Bremen, 2.1; Toledo, 2.

Pennsylvania.—Drifton, 27.5; Troy, 27; Mahanoy Plane, 24; Grampian Hills, 23; Wellsborough, 22.2; Wilkesbarre, 18.2; Dyberry, Catawissa, and Blooming Grove, 18; Erie, 15.5; South Bethlehem and Wysox, 10; Quakertown *a*, 5; Quakertown *b*, 4; Easton, 3.5; Pittsburg, 2.4.

Utah.—Salt Lake City, 10.4; Ogden, 4; Frisco, 2.5.

Vermont.—Post Mills, 20; Chelsea, 19.8; Strafford, 18; Woodstock, 17.2; Marlborough, 17; Burlington, 16; Jacksonville, 13; Brattleborough, 10.2; Windsor and Charlotte, 9; Townshend, 7; Vernon, 5; Newport, 3.9; Dorset, 2.2; Lunenburg, 2.

West Virginia.—Helvetia, 15.

Wyoming.—Cheyenne, 4.5.

Wisconsin.—Wausau, 2.5.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches and tenths.]

Colorado.—Pike's Peak, trace.

Dakota.—Fort Totten, 2.

Maine.—Portland, 4.

Massachusetts.—Mendon, 0.8; Somerset, trace.

Michigan.—Port Huron, 1.2; Marquette, 0.2.

Minnesota.—Saint Vincent, 3; Moorhead, 0.3.

New Hampshire.—Mount Washington, 3; Nashua, 1.

New Jersey.—Dover, trace.

New York.—Mountainville, 7.8; Factoryville and Ithaca, 6; Syracuse, 3; Albany, Rochester, Palermo, and Auburn, 2; Menand Station, 1.5; Oswego and Cooperstown, trace.

Ohio.—Hiram, 2; Garrettsville, 1; Yellow Springs, trace.

Pennsylvania.—Wellsborough, 14.1; Drifton, 14; Blooming Grove, 11; Troy, 9; Dyberry, 8; Grampian Hills, 7; Mahanoy Plane and Catawissa, 6; Wysox, 5; Wilkesbarre, 4.5; Quakertown, 1.

Vermont.—Post Mills, 16; Woodstock, 13; Strafford, 10; Charlotte and Burlington, 6; Brattleborough, 3; Newport, 2; Dorset, trace.

West Virginia.—Helvetia, 3.

Wisconsin.—Wausau, 2.5.

HAIL.

Augusta, Georgia: hail fell on the 6th, three quarters of an inch in diameter, breaking a number of windows.

Cairo, Illinois: hail fell on the 1st, the size of peas, and at two miles east of this station the hail-stones were the size of grapes.

Astoria, Oregon: hail, of considerable size, fell on the 4th.

Tatoosh Island, Washington Territory, 8th: heavy thunder and lightning, accompanied by hail, which fell to the depth of one-half an inch, the ground being completely covered, and from a distance looked as if covered with snow; the hail-stones were one-half inch in diameter.

Hail storms, of which no particulars were reported, occurred in the various states and territories, as follows:

Alabama.—Birmingham, 1st.

Arkansas.—Little Rock, 18th.

California.—Fort Bidwell, 2d; College City, 10th.

Colorado.—Montrose, 11th.

Connecticut.—North Colebrook, 1st, 21st; Voluntown, 2d; New Haven, 24th.

Georgia.—Augusta, 6th; Savannah, 19th.

Illinois.—Anna, 15th.

Louisiana.—Liberty Hill, 6th; Grand Coteau, 9th.

Maine.—Buckfield, 3d, 18th, 20th.

Michigan.—Saginaw, 2d; Grand Haven, 2d, 3d; Pentwater, 2d, 13th.

Nevada.—Fort McDermitt, 2d.

New Jersey.—Dover, 3d, 22d, 26th; Somerville, 3d, 24th, 29th; Sandy Hook, 29th.

New York.—Setauket, 3d, 26th.

North Carolina.—New River Inlet, 19th.

Oregon.—Astoria, 2d; Albany, 4th; Bandon, 22d.

South Carolina.—Spartanburg, 6th.

Tennessee.—Milan, 6th.

Washington Territory.—Tatoosh Island, 2d, 5th, 10th; Pysht, 5th, 26th.

Wisconsin.—Embarras, 18th.

SLEET.

Arizona.—Prescott, 3d.

Colorado.—Pike's Peak, 20th, 21st.

Connecticut.—Bethel, 3d.

Dakota.—Bismarek, 3d, 23d; Fort Sully, 5th; Huron, 6th, 7th.

Illinois.—Bloomington, 20th, 22d.

Indiana.—Indianapolis, 21st; Greencastle, 22d.

Indian Territory.—Fort Supply, 23d.

Iowa.—Davenport, 8th.

Maine.—Portland, 3d; Eastport, 10th, 11th.

Massachusetts.—Boston, 22d; New Bedford, 26th.

Michigan.—Grand Haven, 1st, 2d, 3d, 15th, 21st; Escanaba, 1st, 4th, 12th, 20th, 28th.

Minnesota.—Saint Vincent, 27th, 28th.

Nebraska.—North Platte, 24th.

Nevada.—Winnemucca, 22d.

New Hampshire.—Mount Washington, 2d.

New Jersey.—Beverly, 23d, 25th, 29th; Princeton, 29th.

New York.—Oswego, 3d, 15th, 16th, 25th; Auburn, 21st; New York City, 29th.

Ohio.—Cleveland, 2d, 3d, 23d, 25th, 26th; Columbus and Cincinnati, 22d.

Pennsylvania.—Chambersburg, 1st, 3d; Erie, 2d, 3d, 13th, 21st, 22d; Philadelphia, 23d, 24th, 29th.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for November, 1885.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	57.7	45.4	12.3	11.3	50.7
Alpena, Michigan	40.5	32.4	8.1	12.7	39.2
Augusta, Georgia	60.0	47.0	13.0	10.2	63.8
Baltimore, Maryland	57.3	46.3	11.0	9.8	50.5
Block Island, Rhode Island	55.6	44.9	10.7	8.4	49.2
Boston, Massachusetts	49.3	39.2	10.1	20.9	47.3
Buffalo, New York	45.0	36.0	9.0	10.6	42.3
Canby, Fort, Washington Territory	55.8	49.3	6.5	16.5	50.6
Cedar Keys, Florida	72.9	50.9	16.0	7.9	66.0
Charleston, South Carolina	64.6	53.8	10.8	42.1	64.6
Chicago, Illinois	48.5	37.8	10.7	8.6	44.9
Chincoteague, Virginia	62.8	42.7	20.1	3.6	52.1
Cleveland, Ohio	52.8	38.5	14.3	14.0	43.3
Detroit, Michigan	46.7	39.5	7.2	25.2	44.1
Duluth, Minnesota	44.7	39.5	5.2	10.2	35.1
Eastport, Maine	49.1	44.8	4.3	16.8	42.1
Escanaba, Michigan	47.1	36.2	10.9	17.9	37.4
Galveston, Texas	70.0	58.7	11.3	12.7	66.0
Grand Haven, Michigan	45.9	35.9	10.0	19.0	40.7
Indianola, Texas	83.5	60.5	23.0	8.2	70.9
Jacksonville, Florida	68.4	58.4	10.0	18.0	68.9
Key West, Florida	80.0	70.0	10.0	17.4	74.6
Mackinaw City, Michigan	45.9	38.6	7.3	10.0	38.7
Macon, Fort, North Carolina	68.5	54.6	13.9	9.9	60.0
Marquette, Michigan	42.9	37.3	5.6	12.9	35.7
Milwaukee, Wisconsin	49.7	40.6	9.1	8.0	39.6
Mobile, Alabama	64.6	53.4	11.2	15.8	63.3
New Haven, Connecticut	54.0	40.6	13.4	16.2	48.2
New London, Connecticut	55.4	44.2	11.2	18.2	49.3
New York City	58.4	45.9	12.5	16.9	57.2
Norfolk, Virginia	67.5	54.0	13.5	17.5	63.5
Pensacola, Florida	48.4	40.0	8.4	17.2	42.8
Portland, Maine	53.9	44.8	9.1	51.3	49.4
Sandusky, Ohio	49.0	36.0	13.0	11.4	44.9
Sandy Hook, New Jersey	59.7	45.0	14.7	2.2	50.5
San Francisco, California	59.2	55.9	3.3	38.8	58.2
Savannah, Georgia	61.0	50.2	10.8	10.6	65.2
Smithville, North Carolina	67.1	55.0	12.1	17.0	60.4
Toledo, Ohio	49.2	35.9	13.3	13.2	45.0
Wilmington, North Carolina					

* Record for fourteen days.

WINDS.

The most frequent directions of the wind during November,

1885, are shown on chart ii by arrows flying with the wind; they are also given in the tables of miscellaneous meteorological data. In the upper Mississippi, lower Missouri, and Ohio Valleys, east Gulf states, and on the Atlantic coast south of New England, the prevailing winds were mostly from northwest; in the Lake region they were from northwest to southwest; in the west Gulf states and north Pacific coast region they were southerly; in the Rocky Mountain districts they were variable.

HIGH WINDS.

[In miles per hour.]

Wind-velocities of fifty or more miles per hour were recorded during the month, as follows:

Mount Washington, New Hampshire, 72, nw., 1st; 70, se., 2d; 66, nw., 3d; 67, nw., 4th; 58, nw., 5th; 50, w., 6th; 78, w., 7th; 60, sw., 8th; 74, nw., 9th; 95, nw., 10th; 90, nw., 11th; 78, nw., 12th; 59, sw., 13th; 82, nw., 16th; 91, nw., 17th; 57, sw., 18th; 55, n., 19th; 66, n., 20th; 58, ne., 23d; 51, e., 24th; 78, e., 25th; 63, ne., 26th; 52, ne., 27th.

Pike's Peak, Colorado, 55, n., 1st; 56, w., 2d; 71, w., 3d; 72, w., 6th; 72, n., 7th; 52, nw., 8th; 60, sw., 11th; 56, ne., 13th; 60, w., 16th; 52, nw., 17th; 56, sw., 20th; 52, nw., 29th.

Cape Mendocino, California, 68, se., 1st; 66, se., 3d; 56, se., 6th; 120, se., 7th; 52, se., 8th; 52, se., 15th; 64, se., 16th; 120, se., 17th; 74, se., 21st; 84, se., 22d; 125, se., 23d; 76, se., 24th; 64, se., 26th; 56, se., 27th; 60, se., 28th.

Fort Canby, Washington Territory, 57, se., 7th; 82, s., 18th; 68, s., 23d; 50, sw., 26th; 56, nw., 27th.

Portland, Maine, 50, se., 2d.

Valentine, Nebraska, 52, n., 6th; 54, nw., 11th.

Tatoosh Island, Washington Territory, 52, e., 7th.

Fort Elliott, Texas, 51, nw., 11th.

Barnegat City, New Jersey, 50, e., 23d.

Sandy Hook, New Jersey, 53, ne., 23d.

LOCAL STORMS AND TORNADOES.

Springfield, Illinois: a tornado is reported to have passed through Jacksonville, Morgan county, seventy miles west of Springfield, at about 6.30 p. m. of the 6th.

Cobden, Union county, Illinois: a storm of great severity passed over this place at 4 p. m. of the 6th; it was preceded by heavy hail.

Carmi, White county, Illinois: about 5 p. m. of the 6th this section was visited by a tornado which moved from southwest to northeast. Considerable property was destroyed, and several people were injured.

Pittsfield, Pike county, Illinois: a tornado passed through this county on the afternoon of the 6th, unroofing houses and barns, and doing considerable other injury to property.

Bloomington, McLean county, Illinois: at about 8 p. m. of the 6th a tornado passed through the extreme southwest portion of this place, causing considerable damage.

Muscatine, Muscatine county, Iowa: a tornado passed through Louisa county, southwest of Wapello, on the 6th. It moved in an east-northeasterly direction, causing damage to the amount of from \$6,000 to \$8,000. Debris, such as shingles, blades of corn, etc., were carried a distance of fifteen miles to the northeast of the track of the tornado.

Burlington, Iowa: at 3 p. m. of the 6th a funnel-shaped tornado-cloud passed over this place, striking the ground at a place called Latty, a few miles north of Burlington. The path of the tornado was about fifteen rods wide. Considerable damage was done.

Chattanooga, Tennessee: a tornado is reported to have passed over Decatur, Morgan county, Alabama, on the 6th, unroofing a number of large buildings, and wrecking two steamboats. The force of the tornado, which moved from southwest to northeast, was felt for only about two minutes. The damage is estimated at \$30,000.

Selma, Dallas county, Alabama: one of the most destructive storms known for many years occurred during the night of the 6-7th. Numerous buildings were destroyed, and forests, for

miles, were levelled. The storm passed through Dallas, Perry, and Bibb counties, its path being about one-half mile wide. Thirteen persons were killed and from forty to fifty injured. The storm appears to have been most severe in the vicinity of Plantersville, where a dwelling was blown to pieces with such violence that not even its foundation was left.

Vicksburg, Mississippi: a very unusual electrical display was observed here during a thunder-storm on the 6th.

Mackinaw City, Michigan: a severe thunder-storm passed over this station between 1.30 and 6.30 a. m. of the 7th; the thunder was terrific, and the lightning flashes very vivid. From 2 to 4 a. m. the flashes were almost incessant.

Sacramento, California: a tornado is reported to have occurred in Sacramento county, near the El Dorado county line, on the 7th. The cloud was funnel-shaped and moved northward, leaving a track a mile wide. The roar of the winds was heard when the tornado was several miles away. Much damage was done.

Opelika, Lee county, Alabama: one of the heaviest rains this section has ever experienced fell here on the 7th. Great damage was done to cotton in the field by a heavy fall of hail.

Hopkinsville, Christian county, Kentucky: a severe storm passed north of this place on the 11th; it blew down a dwelling, killing the inmates.

The following are reports of tornadoes which occurred during November, 1885, forwarded by special tornado observers of the Signal Service, of whom there are more than 1,400:

A destructive tornado occurred during the evening of the 5th near Avinger, Cass county, Texas; five persons were killed and seven injured. Two houses were destroyed.

A tornado occurred three miles southeast of New Harmony, Indiana, at 5.40 p. m. of the 6th; damage to property was slight.

At 4.20 p. m. of the 6th a tornado occurred at Alexis, Illinois, destroying a few buildings, entailing a loss of \$10,000. The funnel-shaped tornado-cloud moved north-northeast in a path eighteen miles long and 2,640 feet wide. The progressive velocity was fifty-seven miles per hour.

A tornado passed through White county, Illinois, near Carmi, at 4.45 p. m. of the 6th. The tornado-cloud was funnel-shaped and moved northeast, revolving contrary to the hands of a watch. The length of the path was forty miles and varied in width from 330 to 1,320 feet. One person was killed, many buildings destroyed; the damage is estimated at \$50,000.

A tornado occurred near Dawson, Hopkins county, Kentucky, at 4 p. m. of the 6th, causing the destruction of several buildings, and killing one person.

A tornado passed through Rockport, New Salem, Perry, and Versailles, Illinois, at 3.15 p. m. of the 6th. The tornado-cloud was funnel-shaped, moved north-northeast, and revolved contrary to the hands of a watch, destroying many buildings, and injuring two persons.

A tornado occurred at Alta, Peoria county, Illinois, at 5.45 p. m. of the 6th. The funnel-shaped tornado-cloud moved northeast, destroying several buildings.

A tornado occurred near Rusk, Cherokee county, Texas, at 5 p. m. of the 6th. The tornado-cloud was funnel-shaped, and moved northeast for a distance of eight miles. Three persons were injured, some stock killed, and several buildings destroyed. Loss \$15,000.

A tornado occurred at Brewersville, Sumter county, Alabama, at 8 p. m. of the 6th. The tornado-cloud moved northeast, destroying a number of buildings along its path, which was twelve miles in length; several persons were injured, and a number of cattle killed.

A tornado passed through Orrville, Frog Level, Logan's, and ended near Plantersville, Alabama, at 3.30 p. m. of the 6th; it moved northeast for a distance of thirty miles, having a width varying from 300 to 2,640 feet. The tornado-cloud was funnel-shaped, and revolved contrary to the hands of a watch; it had a progressive velocity of twenty miles per hour. Thirteen persons were killed and fifty wounded; thirty houses were destroyed, also several mills, stables, etc.

A tornado occurred two miles northeast of Vernon, Lamar county, Alabama, at 10 p. m. of the 6th, moving northeast, blowing down houses, trees, etc. The length of the path was thirty miles, and width 300 to 2,700 feet.

A tornado occurred at Estill Springs, Franklin county, Tennessee, at 2 p. m. of the 6th. The tornado-cloud was funnel-shaped, and moved N. 40° E. for a distance of thirty-five miles, with a width of path varying from one hundred and fifty to six hundred feet. Three persons were killed, eight injured, and five houses and a church destroyed.

A tornado occurred at Spartanburg, South Carolina, at 10 a. m. of the 6th, unroofing a hotel and church; no other damage. The path was ninety feet in width.

NAVIGATION.

STAGE OF WATER IN RIVERS.

In the following table are shown the danger-points at the various river stations; the highest and lowest stages for November, 1885, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, November, 1885.

[Expressed in feet and tenths.]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, Louisiana.....	39.9	13, 14, 15	5.7	1, 2, 3	2.0	3.7
<i>Arkansas River:</i>						
Fort Smith, Arkansas.....	22.0	7	3.6	24 to 30	2.5	1.1
Little Rock, Arkansas.....	23.0	9	4.2	28, 29, 30	2.9	1.3
<i>Missouri River:</i>						
Yankton, Dakota.....	24.0	1, 2	11.5	30	10.7	0.8
Omaha, Nebraska.....	18.0	9	6.5	19, 20, 21, 30	5.8	0.7
Leavenworth, Kansas.....	20.0	13	7.0	9	6.9	0.7
<i>Mississippi River:</i>						
Saint Paul, Minnesota.....	14.5	9, 10	3.0	22, 27	1.9	1.1
La Crosse, Wisconsin.....	24.0	1 to 4, 15, 16	3.7	28, 29, 30	3.4	0.3
Dubuque, Iowa.....	16.0	1	4.0	28, 29, 30	3.6	0.4
Davenport, Iowa.....	15.0	8, 9	3.7	30	2.7	1.0
Keokuk, Iowa.....	14.0	11	5.2	30	3.3	1.1
Saint Louis, Missouri.....	32.0	9, 10	12.6	30	9.3	3.3
Cairo, Illinois.....	40.0	14, 15	26.5	2	12.8	13.7
Memphis, Tennessee.....	34.0	17, 18	19.0	4, 5	7.8	11.2
Vicksburg, Mississippi.....	41.0	22, 23	23.2	1	7.9	15.3
New Orleans, Louisiana*.....	13.0	22	6.1	1, 3	2.6	3.5
<i>Ohio River:</i>						
Pittsburg, Pennsylvania.....	22.0	25	7.3	18, 19	3.4	3.9
Cincinnati, Ohio.....	50.0	12	20.0	22, 23	11.1	8.9
Louisville, Kentucky.....	25.0	14	8.7	24, 25, 26	6.1	2.6
<i>Cumberland River:</i>						
Nashville, Tennessee.....	40.0	11	27.0	28, 30	6.5	20.5
<i>Tennessee River:</i>						
Chattanooga, Tennessee.....	33.0	9	30.4	30	4.4	26.0
<i>Monongahela River:</i>						
Pittsburg, Pennsylvania.....	29.0	25	7.3	18, 19	3.4	3.9
<i>Savannah River:</i>						
Augusta, Georgia.....	32.0	9	23.7	5, 6, 22	7.8	15.9
<i>Mobile River:</i>						
Mobile, Alabama.....		6	17.1	25	14.7	2.4
<i>Sacramento River:</i>						
Red Bluff, California.....		25	21.0	1, 2, 3	0.3	20.7
Sacramento, California.....		30	21.2	1, 2, 3	7.5	13.7
<i>Willamette River:</i>						
Portland, Oregon.....		8, 9	8.3	2	1.3	7.0
<i>Colorado River:</i>						
Yuma, Arizona.....		20	16.5	11 to 19	15.6	0.9

NOTE.—The zero of river-gauge at New Orleans was changed on November 1, 1885, from high-water of 1874 to low-water of 1876. This change makes the readings 16.2 feet lower than those made previous to November 1, 1885.

ICE IN RIVERS AND HARBORS.

Red River of the North.—Saint Vincent, Minnesota: floating ice on 12th; navigation closed for the season on the 13th.

Missouri River.—Fort Yates, Dakota: floating ice on the 7th, 12th, 17th, and 26th; on the 30th the river was entirely clear of ice, a very unusual occurrence at this date.

Poplar River, Montana, 30th: river gorged with ice; navigation closed.

Fort Buford, Dakota: navigation closed on the 9th.

Fort Sully, Dakota: floating ice observed in the river on the 18th.

Devil's Lake.—Fort Totten, Dakota, 14th: lake nearly frozen over; navigation suspended.

Mississippi River.—Saint Paul, Minnesota: floating ice, 14th; navigation closed on the 16th.

Dubuque, Iowa: the last boat from the south went into ice harbor on the 22d, closing navigation for the season.

Keokuk, Iowa: the last boat from Saint Paul, Minnesota, arrived on the 23d; navigation above this point closed.

Duluth Bay.—Duluth, Minnesota: thin ice formed in the bay on the 24th.

Maumee Bay.—Toledo, Ohio, 29th: ice formed in the bay during the past three nights.

FLOODS.

Nashville, Tennessee: on the 8th the Cumberland River rose ten feet in twenty-four hours, with a large amount of drift-wood. The recent heavy rains that have fallen throughout this section have caused a considerable rise in all the streams, and damaged property to a limited extent.

Chattanooga, Tennessee: at 2 p. m. on the 8th the river had risen fourteen feet in the preceding twenty-four hours, which is the most rapid rise recorded since the establishment of this station. At 9 p. m. the river reached twenty-eight feet, and at 2 p. m. of the 9th it was thirty and four-tenths feet, the highest stage for the month.

Yuma, Arizona: the rain of the 19th and 20th was the heaviest that has fallen in this vicinity for a long time, and great damage was done to the track of the Southern Pacific railroad, causing delay of trains.

San Francisco, California, 20th: the rainfall for the month at this place has never been exceeded. Reports from Los Angeles state that washouts have occurred on the Southern Pacific railroad, and a portion of the San Fernando tunnel has caved in; the railroad bridge at Cajon Pass was carried away, and great damage done by freshets in all sections of the state.

Petaluma, Sonoma county, California: the storm which set in on the 15th caused Petaluma Creek to overflow, flooding the cellars in the town, and carrying away quantities of cord wood and lumber.

Los Angeles, California, 20th: the heavy rains of the past few days have been unprecedented at this station, and have caused serious damage to railroads and other property.

San Luis Obispo, San Luis Obispo county, California: a remarkably heavy rain fell during the night and early morning of the 18th, and continued at intervals until 2.30 p. m., the total rainfall for this storm being 10.04 inches. This rainfall is generally considered to have been the heaviest that has ever occurred here. All the bridges on the creek running through this town, with one exception, were washed away; in one case a bridge carried with it a large adjoining house. The water-works were also seriously damaged. Telegraph lines were prostrated, and mails delayed. The damage in this vicinity is estimated at \$13,000.

Red Bluff, California, 24th: the continuous, heavy rains have caused a rapid rise in the river. On this date a portion of the track of the California and Oregon railroad was washed away, also several hundred logs from the boom of the Redding Lumber Company. At this place 120,000 bricks in a kiln were dissolved by the heavy rain. All small creeks in the county are much swollen, impeding travel, and drowning considerable stock.

Santa Cruz, Santa Cruz county, California: on the 24th the Lorenzo River overflowed. The rise was so sudden that the people scarcely realized danger until their houses were flooded. Large quantities of drift-wood lodged against the railroad bridge.

Santa Rosa, Sonoma county, California: the creeks in this vicinity were much swollen on the 25th. Many bridges and buildings, and much fencing, were washed away.

HIGH TIDES.

New Haven, Connecticut: the tide rose to an unusual height on the morning of the 2d, and damaged wharf property.

Fort Macon, North Carolina, 23d: the tide was extremely high, for westerly winds, the entire marsh lands being submerged.

Little Egg Harbor, New Jersey: a very high tide occurred on the 23d; out-houses, pavilions, and wharves were flooded.

Newport, Rhode Island: the wharves were flooded by the very high tide of the 23d.

New York City: the highest tide known for forty-five years occurred on the 24th; much damage resulted from cellars and sewers overflowing. At 10 a. m. the water had reached a mark four inches higher than the flood of February, 1885, when the East River was higher than for a quarter of a century. The Harlem River rose three feet and eight inches above high-water mark. Wharves along the Hudson River, as far as Poughkeepsie, were flooded.

Long Branch, New Jersey, 24th: the damage caused by high tides along this part of the New Jersey coast is very heavy; bathing houses were washed away, and wharves badly damaged.

Cape Mendocino, California: the highest tide ever known in Humboldt county occurred on the 24th; the water backed up to a great distance on every side from the main rivers; from the adjoining hills the lowlands looked like a vast ocean. At Eureka the lumber mills were compelled to shut down, the water overflowing the wharves. Thousands of acres supposed to have been above high-water mark were inundated.

Pysht, Washington Territory, 24th: an unusually high tide at 2 p. m.; the highest known for several years.

Chatham, Massachusetts: an unusually high tide occurred on the 24th; Chatham beach was almost submerged.

Atlantic City, New Jersey, 24th: the tide this morning is the heaviest for years. Much damage was done to property along the ocean front.

Cape May, New Jersey: very high tides occurred on the 23d and 24th. Much of the beach front was washed away, and wharves, etc., demolished and carried out to sea. Railroad travel was suspended on account of the high water.

New Haven, Connecticut: the highest tide in twenty-nine years occurred on the 24th; it rose three feet above high-water mark, and covered the wharves.

High tides also occurred at the following places:

Portland, Maine, 24th, 25th.

Eastport, Maine, 24th, 25th, 26th.

Narragansett Pier, Rhode Island, 24th.

Chincoteague, Virginia, 23d, 24th.

Sandy Hook, New Jersey, 23d, 24th.

Cedar Keys, Florida, 22d.

Pysht, Washington Territory, 23d.

Tatoosh Island, Washington Territory, 7th.

Taunton, Massachusetts, 24th, 25th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for November, 1885, with the telegraphic reports for the succeeding thirty-two hours, shows the general average percentage of verifications to be 79.90 per cent. The percentages for the four elements are: Weather, 84.25; direction of the wind, 76.88; temperature, 77.23; barometer, 84.83 per cent. By geographical districts, they are: For New England, 75.48; middle Atlantic states, 83.01; south Atlantic states, 85.28; eastern Gulf states, 84.15; western Gulf states, 82.27; lower lake region, 77.27; upper lake region, 76.66; Ohio Valley and Tennessee, 82.31; upper Mississippi valley, 76.11; Missouri Valley, 77.17. There were twenty-four omissions to predict, out of 2,934, or 0.82 per cent. Of the 2,910 predictions that have been made, one hundred and twenty-seven, or 4.36 per cent., are considered to have entirely failed; one hundred and forty-eight, or 5.09 per cent., were one-fourth verified; four hundred and forty-nine, or 15.43 per cent., were one-half verified; four hundred and eighty-nine, or 16.80 per cent., were three-fourths verified; 1,697, or 58.32 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

The percentages of verifications of special predictions for certain localities are, as follows:

Omaha, Nebraska (twenty-five days), 84.69; Arkansas, (twenty-five days), 82.00; Tennessee (twenty-four days), 84.26; Georgia (twenty-five days), 86.50; Washington City (twenty-

nine days), 79.31; Baltimore, Maryland (twenty-eight days), 86.11; Erie, Pennsylvania, 66.25; Boston, Massachusetts, 77.50; Portland, Maine (twenty-nine days), 72.41; Albany, New York, 81.67; Pittsburg, Pennsylvania, 66.67; Cincinnati, Ohio, 77.50; Louisville, Kentucky, 83.33; Columbus, Ohio, 71.67; Cleveland, Ohio, 57.64; Indiana, 83.33; Oswego, New York, 63.33; Rochester, New York, 63.33; Buffalo, New York, 62.50; Milwaukee, Wisconsin, 73.33; Chicago, Illinois, 76.67; Detroit, Michigan, 74.17; Toledo, Ohio, 73.33; Sandusky, Ohio, 67.50; Cairo, Illinois, 87.71; Saint Louis, Missouri, 88.56; Memphis, Tennessee, 80.83; Shreveport, Louisiana, 87.91; Iowa (twenty-nine days), 76.21.

CAUTIONARY SIGNALS.

During November, 1885, two hundred and fourteen cautionary signals were ordered. Of these, one hundred and fifty-eight, or 73.83 per cent., were justified by winds of twenty-five miles or more per hour, at or within one hundred miles of the station. Sixty-two cautionary off-shore signals were ordered, of which number, forty, or 64.52 per cent., were fully justified both as to direction and velocity; fifty-six, or 90.32 per cent., were justified as to direction, and forty-eight, or 77.42 per cent. were justified as to velocity. Two hundred and seventy-six signals of all kinds were ordered, one hundred and ninety-eight, or 71.74 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, forty-one were changed from cautionary signals. Five signals were ordered late. In forty-two cases, winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

During the month there were one hundred and fifty cold-wave signals displayed. Of these, there were one hundred and twenty-six, or 84.0 per cent., justified. In eight cases the signals were considered to have been ordered late.

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for November, 1885, states:

The verifications of predictions for the whole area was 86 per cent. for temperature, and 90 per cent. for weather.

The following roads comprise this system: Western of Alabama; South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Atlanta and Charlotte Air Line; Western and Atlantic; Georgia; East Tennessee, Virginia and Georgia system in Georgia; and Savannah, Florida and Western.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays occurred during November, as follows:

Alpena, Michigan, 7th: an aurora was observed at 7.20 p. m., consisting of a diffused light, resting on a dark segment, from which a few small streamers, having an apparent motion from east to west, were noted; the display disappeared at 10.30 p. m.

Mackinaw City, Michigan, 7th: an aurora was observed from 9.30 to 10.30 p. m., consisting of a segment above a bank of clouds of 30° altitude; the light was of a pale yellow color; occasionally a streamer was observed to shoot up above the clouds to an altitude of 65°. At 10 p. m. the sky became obscured.

Fort Buford, Dakota, 7th: an aurora, consisting of a pale white light, was visible from 9.22 p. m. until near midnight; the sky was obscured at intervals.

Fort Totten, Dakota, 7th: an auroral light, of pale yellow color, was observed in the north from 8 to 11 p. m.; the display was partially obscured by clouds.

Fort Sully, Dakota, 7th: there was a faint auroral glow in the north between 8 p. m. and 12.30 a. m. of the 8th.

Fort Bennett, Dakota, 7th: a faint auroral light was observed between 8.10 and 11.30 p. m., in the north-northeast,

Table of miscellaneous meteorological data for November, 1885—Signal Service observations.

Stations.	Elevation above sea-level.	Atmospheric pressure (in inches and hundredths).				Temperature of the air (in degrees Fahrenheit).										Winds.																		
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.	Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.	Daily ranges.		Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.		Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.								
									Highest barometer.	Lowest barometer.		Max.	Date.						Mean max.	Min.							Date.	Mean min.	Greatest.	Date.	Least.	Date.	Miles p. h.	Direction.
New England.																																		
Eastport.....	61	29.82	-.15	29.89	30.40	1	29.41	100.98	39.2	+ 3.8	57.1	8	44.6	24.2	20	33.8	32.9	16.3	19	4.5	14	77.1	32.4	4.78	+ 0.06	8,513	ne.	45	no.	25	13	8	16	6
Portland.....	99	29.80	-.16	29.91	30.39	1	29.52	100.86	38.4	+ 3.3	55.1	9	44.6	24.2	20	33.2	35.6	18.9	28	4.3	7	81.1	32.9	3.43	+ 0.31	5,666	ne.	50	no.	2	10	9	17	7
Mount Washington.....	6,279	23.51	.....	30.07	30.50	6	29.47	100.96	21.4	+ 5.0	51.0	8	27.6	5.8	25	15.8	45.2	24.3	9	3.9	10	94.9	20.2	6.07	+ 0.05	23,100	nw.	95	nw.	10	20	3	18	9
Boston.....	125	29.76	-.21	29.89	30.40	1	29.55	100.94	43.8	+ 4.5	68.8	13	50.6	23.3	28	37.2	45.5	35.0	5	4.7	24	74.6	35.6	5.78	+ 0.72	9,332	w.	40	no.	25	12	13	8	9
Block Island.....	27	29.89	.....	29.91	30.33	1	29.50	25.0	83.47	+ 1.2	64.0	8	51.9	31.4	28	42.9	32.6	17.8	19	2.5	23	84.7	42.6	4.79	+ 0.42	13,344	sw.	47	no.	26	12	13	15	8
Narragansett Pier.....	.....	.....	.....	.....	.....	.....	.....	45.1	.....	.....	68.0	8	52.3	33.0	29	38.9	45.0	.....	.....	.....	.....	.....	.....	2.34	+ 1.50	.....	.....	.....	.....	.....	.....	.....	.....
New Haven.....	107	29.81	.....	29.92	30.32	27	29.53	23.0	79.42	+ 1.7	64.8	12	49.5	19.1	28	35.0	45.7	73.4	1	5.0	24	75.8	34.8	3.49	+ 0.51	6,837	n.	32	e.	2	11	11	13	.....
New London.....	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Middle Atlantic States.																																		
Albany.....	83	29.86	-.19	29.95	30.40	27	29.61	13.0	79.40	+ 1.7	67.7	7	45.9	15.0	28	34.7	52.7	22.7	1	4.3	10	75.3	33.0	3.90	+ 1.33	5,095	s.	28	no.	.....	.....	.....	.....	.....
New York City.....	104	29.76	-.21	29.94	30.34	27	29.57	25.0	77.44	+ 2.2	68.6	13	52.5	25.0	28	39.2	43.6	25.5	19	4.9	26	71.4	35.5	5.05	+ 1.70	7,098	nw.	40	nw.	10	11	18	10	3
Philadelphia.....	117	29.84	-.23	29.96	30.37	28	29.62	19.0	75.45	+ 1.8	71.0	7	51.9	28.8	28	38.1	42.2	30.1	12	5.0	27	74.9	36.9	3.35	+ 0.15	7,828	nw.	32	no.	.....	.....	.....	.....	.....
Atlantic City.....	13	29.92	.....	29.92	30.34	28	29.54	19.0	80.46	+ 2.1	64.7	7	53.3	28.8	28	39.3	37.9	22.1	11	4.5	30	82.6	40.9	6.84	+ 3.40	6,645	nw.	37	n.	23	14	9	18	3
Barnegat City.....	22	29.92	-.21	29.93	30.34	27	29.56	19.0	78.47	+ 3.1	64.6	12	52.6	31.2	28	41.4	33.4	22.0	1	2.3	30	83.2	42.0	4.89	+ 0.66	11,585	w.	50	e.	23	14	9	15	6
Cape May.																																		
Sandy Hook.....	28	29.92	-.21	29.94	30.36	27	29.57	25.0	79.46	+ 1.6	72.0	8	52.7	29.9	28	41.1	36.9	.....	.....	.....	.....	.....	.....	6.05	+ 4.12	.....	.....	.....	.....	.....	.....	.....	.....
Cape Henlopen.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.83	+ 1.77	14,290	nw.	53	no.	23	10	10	14	6
Baltimore.....	45	29.93	-.22	29.97	30.38	27	29.62	23.0	76.45	+ 0.4	73.8	7	53.0	32.5	17	39.3	44.9	.....	.....	.....	.....	.....	.....	4.05	+ 1.77	.....	.....	.....	.....	.....	.....	.....	.....
Ocean City.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.04	+ 1.00	4,199	nw.	23	sw.	5	13	13	14	3
Washington City.....	106	29.88	-.20	29.98	30.38	27	29.56	23.0	76.45	+ 1.3	71.0	7	52.1	33.9	17	38.7	41.3	22.5	17	4.8	24	76.2	37.7	3.33	+ 0.45	4,444	nw.	23	no.	.....	.....	.....	.....	.....
Cape Henry.....	16	29.98	.....	29.98	30.38	27	29.56	23.0	81.51	+ 0.6	77.9	7	58.2	33.3	3	44.5	44.0	25.9	3	4.2	24	72.9	42.4	4.24	+ 0.13	10,521	nw.	44	n.	15	11	12	12	6
Chincoteague.....	8	29.96	-.22	29.95	30.37	27	29.55	23.0	82.48	+ 0.8	66.9	12	54.7	31.2	28	39.5	38.7	31.22	9	4.6	27	77.8	41.5	4.07	+ 0.97	9,302	nw.	41	no.	29	9	13	8	.....
Lynchburg.....	652	29.30	-.18	30.00	30.40	27	29.55	23.0	75.45	+ 0.3	71.6	12	54.8	28.13	26	36.9	43.3	35.11	.....	.....	.....	.....	.....	2.83	+ 0.52	2,368	nw.	18	no.	2	12	8	15	7
Norfolk.....	30	29.95	-.18	29.98	30.36	27	29.57	19.0	78.51	+ 1.6	78.1	7	58.9	35.4	21	44.5	42.7	24.5	5	6.4	24	74.9	43.0	4.04	+ 1.27	5,394	n.	20	n.	19	14	8	12	10
South Atlantic States.																																		
Charlotte.....	808	29.17	-.15	30.02	30.40	27	29.63	23.0	77.49	+ 1.0	75.7	6	51.8	27.7	27	39.8	48.0	29.3	30	5.8	29	72.6	39.5	4.10	+ 0.04	3,131	s.	17	nw.	25	12	7	11	12
Fort Macon.....	11	30.01	.....	29.99	30.36	27	29.56	23.0	81.54	+ 1.5	72.0	7	61.2	34.2	25	47.6	38.0	21.6	12	4.6	26	80.5	40.3	3.58	+ 0.78	8,805	nw.	36	n.	20	11	4	13	13
Hatteras.....	12	29.99	-.16	29.98	30.37	27	29.57	23.0	80.54	+ 1.0	77.2	8	61.1	39.0	26	48.5	38.0	24.2	5	4.2	25	75.4	46.7	3.65	+ 2.03	8,153	nw.	36	n.	20	12	4	14	12
Kitty Hawk.....	9	30.00	.....	29.99	30.38	27	29.59	23.0	80.52	+ 1.1	74.9	8	59.1	36.0	21	45.7	38.9	23.8	23	4.3	30	74.3	43.5	4.55	+ 0.71	9,051	sw.	47	n.	30	11	4	19	7
Smithville.....	34	29.98	-.16	29.99	30.36	27	29.57	23.0	78.54	+ 0.9	74.2	7	61.5	38.9	25	45.2	45.3	22.9	1	6.3	30	78.2	47.0	4.33	+ 1.31	5,590	n.	37	s.	8	11	5	12	13
Charleston.....	52	29.99	-.12	30.01	30.37	27	29.60	23.0	76.58	+ 1.4	78.4	6	66.5	34.6	25	51.2	41.4	21.9	1	8.7	30	74.4	46.9	1.94	+ 1.42	3,160	nw.	16	nw.	2	10	7	13	10
Augusta.....	183	29.87	-.15	30.03	30.37	27	29.68	23.0	76.52	+ 1.4	84.9	6	66.3	28.2	27	41.2	50.7	32.16	6	6.4	28	76.0	43.3	1.55	+ 2.55	2,043	w.	18	sw.	23	8	2	14	14
Savannah.....	87	29.96	-.13	30.02	30.33	27	29.64	23.0	76.59	+ 0.9	79.5	6	69.3	35.0	25	49.7	44.5	22.2	1	6.0	30	70.2	47.4	0.01	+ 1.93	4,649	nw.	23	nw.	7	7	2	14	14
Jacksonville.....	43	30.01	-.08	30.02	30.27	27	29.65	23.0	76.40	+ 1.4	81.2	6	69.9	35.4	26	52.1	44.8	27.6	27	6.4	30	74.6	51.3	0.50	+ 2.62	3,669	nw.	24	nw.	13	5	5	12	13
Florida Peninsula.																																		
Cedar Keys.....	22	30.02	-.09	30.00	30.21	26	29.71	19.0	50.60	+ 3.2	78.6	7	67.6	38.8	25	53.9	39.8	21.6	17	3.6	30	82.6	54.9	1.17	+ 1.68	5,220	nw.	33	nw.	19	5	5	11	14
Key West.....	20	30.03	-.02	30.00	30.18	26	29.85	23.0	34.71	+ 3.1	84.0	6	70.1	55.2	26	68.1	27.8	16.7	22	4.2	29	79.6	64.8	0.43	+ 2.09	7,353	nw.	28	nw.	20	3	5	17	8
Sanford.....	25	30.04	.....	30.03	30.27	27	29.72	19.0	55.62	+ 4.4	86.5	6	73.1	34.9	26	53.9	51.6	32.3	27	11.3	30	74.4	53.4	0.29	+ 0.61	3,625	nw.	20	nw.	9	5	5	9	16
Eastern Gulf States.																																		
Atlanta.....	1,129	28.87	-.13	30.06	30.35	27	29.70	22.0	66.50	+ 2.1	73.0	6	58.5	29.2	26	42.5	43.8	26.8	10	5.8	28	69.9	39.4	3.98	+ 0.69	7,365	nw.	26	nw.	23	12	5	14	11
Pensacola.....	30	30.05	-.09	30.04	30.25	26	29.76	22.0	49.57	+ 3.1	79.4	6	65.6	33.3	26	48.9	43.1	24.6	7	4.1	13	73.2	48.2	11.07	+ 6.56	5,021	n.	32	sw.	7	14	10	6	14
Mobile.....	35	30.05	-.09	30.05	30.30	26	29.74	22.0	57.50	+ 2.8	75.0	10	65.2	32.0	26	47.2	43.0	29.7	17	5.1	28	73.9	46.5	4.83	+ 0.51	5,602	nw.	23	no.	28	8	6	11	13
Montgomery.....	219	29.84	-.11	30.04	30.27	27	29.68	22.0	62.54	+ 0.5	79.3	6	63.6	31.0	26	45.4	48.3	28.7	21	5.8	28	71.6	43.6	3.99	+ 0.03	3,695	nw.	23	nw.	19	10	8	10	12
Vicksburg.....	209	29.86	-.11	30.06	30.35	25	29.67	22.0	68.50	+ 1.1	84.8	6	66.9	31.2	24	46.8	53.6	29.6	9	5.1	29	65.2	42.9	3.19	+ 2.00	3,656	n.	28	n.	12	7	6	10	14
New Orleans.....	52	30.02	.....	30.04	30.32	25	29.74	22.0	58.59	+ 1.2	84.7	6	67.6	40.0	25	52.2	44.7	22.9	15	3.6	29	75.3	50.8	3.47	+ 1.94	5,001	n.	24	n.	5	6	5	12	13
Western Gulf States.																																		
Shreveport.....	227	29.83	-.10	30.04	30.35	25	29.54	5.0	81.56	+ 1.7	80.8	6	66.8	31.6	25	45.4	49.2	30.4	9	5.5	28	67.1	43.2	3.39	+ 1.54	.....	s.	.....	.....	.....	6	5	9	16
Fort Smith.....	470	29.52	-.13	30.02	30.30	25	29.49	5.0	88.51	+ 0.1	79.9	9	63.8	25.1	25	40.3	54.8	40.5	2	5.8	28	65.0	37.7	1.12	+ 2.93	3,217	e.	26	sw.	6	4	6	11	13
Little Rock.....	299	2.71	-.15</																															

Table of miscellaneous meteorological data for November, 1885—Signal Service observations—Continued.

Stations.	Elevation above sea level.	Atmospheric pressure (in inches and hundredths).				Temperature of the air (in degrees Fahrenheit).												Winds.				No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.							
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.	Daily ranges.		Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.											
					Highest barometer.	Lowest barometer.				Max.	Min.		Greatest.	Least.							Miles p. hr.					Direction.						
					Date.	Date.				Date.	Date.		Date.	Date.							Date.					Date.						
Upper Mississippi Valley.																																
Saint Paul.....	831	29.06	— .08	30.00	30.36	29.41	7.0.95.33.3	— 2.3	52.7	10	39.7	17.2	15	27.3	35.5	29.1	16	4.2	30	85.2	29.1	0.60	— 0.77	4.030	w.	24	ne.	6	6	14	13	3
La Crosse.....	725	29.17	— .11	29.97	30.34	27.29	7.0.92.38.0	— 4.5	58.0	11	44.0	20.8	27	32.6	37.2	33.7	16	3.8	30	75.6	30.8	0.60	— 1.39	4.945	nw.	28	nw.	18	6	15	11	4
Davenport.....	615	29.32	— .13	29.99	30.30	27.29	6.0.88.38.1	— 2.6	64.1	11	46.5	22.7	14	31.6	41.4	34.2	12	5.1	8	77.9	31.3	1.20	— 0.91	5.004	nw.	30	sw.	7	6	11	12	7
Des Moines.....	849	29.07	— .13	29.99	30.42	24.29	6.0.99.39.2	— 2.0	66.3	17	48.0	21.4	14	32.2	44.9	27.2	10	5.0	19	77.2	32.3	0.61	— 1.98	4.124	n.	24	s.	6	6	12	9	9
Dubuque.....	665	29.20	— .14	29.98	30.36	27.29	11.0.90.37.6	— 2.4	61.9	11	43.7	19.3	27	30.8	42.6	34.2	12	5.0	30	76.5	30.5	0.64	— 2.56	3.358	nw.	16	s.	7	5	12	15	3
Keokuk.....	618	29.30	— .14	30.00	30.35	27.24	6.0.94.40.6	— 2.0	73.2	11	50.7	22.1	14	32.6	51.1	34.7	12	3.2	19	75.0	32.8	0.88	— 1.21	6.195	nw.	28	sw.	7	3	10	7	10
Calmar.....	359	29.65	— .16	30.02	30.30	29.58	22.0.72.48.7	— 2.7	75.6	6	55.6	27.7	26	40.1	47.9	39.3	12	3.3	24	67.3	37.1	2.79	— 1.23	6.067	w.	33	nw.	22	9	14	7	9
Springfield.....	644	29.29	— .17	29.97	30.32	27.29	6.0.87.45.0	— 3.8	70.2	11	55.6	29.8	14	38.0	40.4	28.5	16	7.0	8	68.1	35.3	1.44	— 2.06	6.978	nw.	27	ne.	22	5	9	12	9
Saint Louis.....	571	29.39	— .16	30.01	30.32	27.29	6.0.78.47.8	— 5.0	76.1	11	56.2	31.8	13	40.4	44.4	33.0	13	4.2	24	72.1	38.7	1.68	— 1.01	9.000	w.	41	se.	6	7	9	11	10
Missouri Valley.																																
Lamar.....	1,028	28.92	— .15	30.03	30.38	25.29	6.0.88.47.2	— 3.5	80.0	11	59.3	21.6	25	36.7	58.4	37.0	12	6.4	29	64.0	33.7	0.49	— 0.62	7.777	sw.	37	sw.	6	3	5	14	11
Leavenworth.....	842	29.10	— .15	30.02	30.39	25.29	6.1.03.43.5	— 3.5	75.5	17	53.8	26.0	14	34.0	49.5	38.9	10	8.7	23	67.6	32.7	1.86	— 0.62	4.463	s.	30	sw.	6	4	8	12	10
Omaha.....	1,113	28.82	— .12	30.04	30.39	24.29	6.1.03.39.9	— 4.0	63.1	10	48.3	21.5	14	32.2	41.6	24.9	20	6.9	29	80.0	33.9	0.73	— 0.63	6.040	nw.	32	nw.	12	4	8	13	9
Valentine.....	2,603	27.23	— .10	30.04	30.41	29.55	6.0.86.37.3	— 3.0	68.9	20	50.7	16.1	8	25.7	42.8	38.6	19	7.1	24	70.4	27.3	0.37	— 0.01	7.482	nw.	54	nw.	11	2	9	12	9
Fort Bennett.....	1,510	28.36	— .10	30.05	30.41	29.55	11.0.86.33.6	— 4.4	54.4	20	43.6	12.1	8	25.7	42.3	31.3	10	4.5	6	78.5	27.3	0.28	— 0.01	5.442	se.	44	n.	7	3	6	17	7
Fort Sully.....	1,307	28.57	— .09	30.05	30.40	29.54	6.0.85.30.0	— 0.4	55.0	21	38.5	7.8	14	22.8	47.2	29.7	20	4.5	6	70.6	21.5	1.50	— 1.18	5.467	se.	38	ne.	6	3	6	15	9
Huron.....	1,228	28.66	— .13	30.04	30.37	24.29	6.1.03.34.8	— 2.7	67.5	10	45.6	18.4	25	26.5	49.1	35.0	16	7.3	18	81.0	29.1	2.69	— 2.34	5.900	nw.	36	nw.	12	5	8	10	12
Northern slope.																																
Fort Assinaboine.....	2,720	27.03	— .18	30.02	30.35	29.29	20.0.70.40.3	— 11.8	64.1	18	52.3	14.6	4	25.6	49.5	46.8	1	13.4	27	60.3	27.0	0.16	— 0.95	7.846	w.	43	w.	8	5	5	14	11
Fort Benton.....	2,681	27.07	— .18	30.03	30.39	29.29	20.0.75.41.3	— 13.8	68.0	1	56.1	15.9	4	28.0	52.1	44.8	1	12.7	8	69.6	31.2	0.65	— 0.14	2.692	sw.	32	w.	30	3	9	13	8
Fort Custer.....	3,040	26.70	— .14	30.08	30.44	29.29	20.0.81.39.2	— 7.7	72.3	8	54.6	9.8	12	25.3	62.5	44.0	1	13.0	21	68.6	28.5	0.24	— 0.26	4.170	se.	24	n.	11	4	3	10	7
Fort Maginnis.....	4,340	25.43	— .10	30.03	30.33	29.70	4.0.63.41.1	— 8.2	61.5	20	51.2	20.2	29	30.2	41.3	30.1	1	13.0	21	87.0	26.6	0.67	— 0.66	6.473	n.	44	n.	8	6	9	18	3
Fort Shaw.....	3,550	26.22	— .10	30.05	30.38	29.67	20.0.72.41.8	— 11.1	60.9	18	47.5	9.2	4	30.9	—	—	—	—	—	—	—	0.03	— 0.66	6.894	w.	36	w.	27	2	4	17	9
Helena.....	4,044	25.72	— .18	30.05	30.44	29.29	4.0.78.39.1	— 9.5	60.9	18	47.5	19.8	12	30.4	41.1	30.4	7	9.8	10	62.8	27.1	0.15	— 0.53	4.561	sw.	28	sw.	20	5	3	23	3
Poplar River.....	4,030	27.77	— .10	30.07	30.43	29.67	30.0.76.32.4	— 8.9	63.2	20	50.5	10.2	30	21.7	44.8	—	—	—	—	—	—	0.29	— 0.04	2.859	sw.	36	n.	10	4	8	13	3
Deadwood.....	4,600	25.10	— .06	30.14	30.46	29.73	5.0.73.41.0	— 8.9	63.2	20	50.5	15.3	12	31.4	47.9	33.7	11	10.8	6	71.7	32.0	1.40	— 0.33	2.357	sw.	24	sw.	11	6	3	10	17
Cheyenne.....	6,105	23.94	— .07	30.16	30.46	29.61	5.0.85.39.0	— 5.7	67.1	2	51.3	15.9	12	27.4	51.2	42.7	1	4.3	6	58.0	24.1	1.11	— 0.85	8.376	nw.	44	nw.	21	5	2	17	11
North Platte.....	2,841	27.03	— .12	30.08	30.44	29.41	6.1.03.39.5	— 5.1	63.0	19	50.8	23.3	13	30.7	39.7	32.2	15	3.2	27	79.9	33.3	1.71	— 1.39	4.637	w.	40	nw.	6	9	9	3	18
Middle slope.																																
Denver.....	5,294	24.70	— .08	30.19	30.53	29.59	5.0.94.42.9	— 5.4	75.0	10	57.0	11.2	12	30.8	63.8	41.7	10	8.2	5	55.8	25.9	0.55	— 0.15	5.066	s.	35	n.	11	5	8	7	15
Pike's Peak.....	14,134	17.74	— .30	30.39	30.75	29.79	5.0.90.13.8	— 3.1	33.2	9	18.4	—	—	8.2	42.2	28.3	7	3.0	29	84.5	9.8	0.87	— 1.07	17.657	w.	72	nw.	6	8	0	17	13
West Las Animas.....	3,899	26.01	— .07	30.10	30.45	29.46	5.0.99.41.9	— 5.0	79.3	10	59.7	19.8	7	27.7	59.5	52.5	8	11.8	4	72.3	32.0	0.70	— 0.32	4.697	w.	44	n.	12	6	4	13	13
Concordia.....	1,884	28.50	— .10	30.00	30.33	29.28	5.1.05.41.8	— 6.4	74.9	10	53.2	24.1	13	31.5	50.8	42.7	10	6.0	5	74.9	33.3	0.61	— 0.30	5.303	e.	33	sw.	6	5	6	12	12
Dodge City.....	2,517	27.37	— .13	30.06	30.41	29.38	5.1.05.42.2	— 6.4	75.5	10	57.6	21.2	13	35.1	54.3	37.8	13	3.4	20	65.2	31.9	0.36	— 0.30	6.652	nw.	40	w.	1	2	6	12	12
Fort Reno.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fort Supply.....	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fort Elliott.....	2,650	27.20	— .12	30.11	30.46	29.49	5.0.95.47.4	— 6.4	83.4	10	63.6	21.0	13	34.3	62.4	46.4	10	3.3	26	55.0	28.3	0.25	— 0.48	6.581	nw.	51	nw.	11	2	1	11	16
Southern slope.																																
Abilene.....	1,745	28.23	— .10	30.12	30.47	29.57	5.0.91.56.2	— 4.8	85.8	17	69.7	27.4	13	45.7	58.4	34.7	9	7.0	26	68.1	44.6	0.23	— 0.75	6.585	sw.	32	sw.	11	3	2	11	17
Fort Sill.....	1,300	28.75	— .16	30.03	30.37	29.39	5.0.97.52.0	— 4.8	84.0	11	66.3	25.0	13	40.1	59.0	42.5	8	3.8	26	59.3	34.3	1.28	— 0.52	6.890	s.	38	sw.	21	3	2	12	16
Fort Davis.....	4,938	25.25	— .10	30.06	30.34	29.68	5.0.66.54.9	— 5.0	81.5	9	70.3	25.0	13	42.3	56.5	42.3	14	10.3	3	41.2	28.6	0.01	— 0.75	5.145	sw.	32	sw.	10	1	0	9	21
Fort Stockton.....	3,004	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fort Stanton.....	2,396	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Southern plateau.																																
El Paso.....	3,764	26.29	— .02	30.11	30.37	29.67	5.0.70.53.8	— 3.2	78.3	10	68.0	23.3	13	39.8	55.0	40.2	14	14.2	5	43.3	29.4</											

in the form of an arch, which extended over 30° of the horizon and to an altitude of 12°.

Mackinaw City, Michigan, 9th: at 7.30 p. m. the clouds disappeared in the northern sky, showing an auroral light of 35° altitude and 90° azimuth; it was of a dull gray color; after 9.45 p. m. occasional streamers shot up to an altitude of 75°; at 11.45 p. m. the sky became obscured.

Bismarck, Dakota, 9th: a faint aurora was observed at 8.30 p. m., consisting of a pale yellow light, which extended from 135° to 235° azimuth and to 20° altitude; it attained its maximum brilliancy at 10.05 p. m., and disappeared at 10.50 p. m. No dark segment was observed.

Moorhead, Minnesota, 9th: a faint auroral arch was observed at 9.30 p. m., consisting of a white light, of 15° altitude, without streamers.

Fort Yates, Dakota, 9th: a very faint aurora was observed at 10.00 p. m., the sky being partly obscured.

Fort Totten, Dakota, 9th: auroral light was observed in the north at 9 p. m.; it was obscured by clouds at 10 p. m.

Cambridge, Massachusetts: an auroral arch was observed during the evening of the 9th.

Boston, Massachusetts, 9th: an auroral display was observed from 8.30 to 11 p. m.; it extended from 160° to 225° azimuth and to an altitude of 25°; it was of a pale straw color and was accompanied by "merry dancers."

Albany, New York, 9th: a faint auroral arch of 10° altitude, extending from 150° to 225° azimuth, was observed at 8.40 p. m.; at 11 p. m. the light became diffused and the northwest portion of the dark segment became detached. The light was of a pale straw color, and disappeared at midnight. No streamers appeared. A black cloud extended along the eastern horizon throughout the display.

Escanaba, Michigan, 9th: a bright aurora appeared at 9.08 p. m., consisting of an arch above a bank of clouds; at 10 p. m. a second arch appeared, about 5° above that first observed, with several streamers of bright yellow color. The display continued until early in the morning of the 10th.

Marquette, Michigan, 9th: an aurora was observed at 10 p. m.; the sky being nearly obscured no special features were noted.

Mackinaw City, Michigan, 10th: a faint auroral light was seen from 6.45 to 8.30 p. m.; altitude, 25°; azimuth, 75°.

Fort Totten, Dakota, 10th: a faint auroral light in the north was seen at 10 p. m., the display ending at 4 a. m. of the 11th.

Bangor, Maine, 11th.

Fort Buford, Dakota, 11th: an auroral display began at 10.14 p. m.; when first observed two streamers, of a whitish color, extended to about 40°; they were nearly stationary, and had a slight reddish hue near the horizon; at 10.40 p. m. the streamers gradually diffused along the horizon to about 8° to 10° altitude and 40° azimuth, between north-northwest and northeast, forming a bank having the appearance of smoke, which continued until 11.10 p. m., after which the aurora gradually disappeared.

Menand Station, New York, 14th: at 9 p. m. three parallel arches, having about 15° altitude and 120° azimuth, extended from north to southeast; the uppermost arch was apparently 3° in width; the lower one exhibited faint lines of light, without motion; the display disappeared at 9.30 p. m.

Cambridge, Massachusetts, 17th: an aurora was suspected at 8.45 p. m.

The following stations report auroras, the observers giving dates only:

6th.—Thornville, Michigan.

7th.—Birmingham, Michigan; Napoleon, Ohio; North Volney and Ithaca, New York; Beverly, New Jersey.

9th.—Webster, Dakota; Cresco, Iowa; Kent's Hill, Maine; Manistique, Michigan; Embarras, Manitowoc, and Prairie du Chien, Wisconsin; Southington, Connecticut; Riley, Illinois.

10th.—Webster, Dakota; Gardiner, Maine; Westborough, Massachusetts.

11th.—Gardiner and Orono, Maine; Burlington, Vermont.

12th.—Atchison, Kansas; Harvard, Nebraska; Yellow Springs, Ohio.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories, as follows:

Alabama.—Mobile, 5th, 7th; Birmingham, 6th; Greensborough, 6th, 7th, 22d; Montgomery, 6th, 7th, 23d.

Arizona.—Prescott, 3d; Fort Grant, 3d, 4th.

Arkansas.—Fort Smith, 4th, 5th, 17th; Little Rock, 4th, 5th, 6th, 17th, 18th; Mount Ida, 4th, 5th, 26th, 27th; Lead Hill, 5th, 18th.

California.—Sacramento and College City, 10th; Keeler, 16th; San Rafael, 22d.

Florida.—Limona, 7th, 8th; Sanford, 7th, 19th; Tallahassee, 23d; Key West, 28th.

Georgia.—Forsyth, 6th; Augusta, 6th, 7th; Atlanta, 6th, 7th, 23d; Athens, 6th, 22d.

Illinois.—Chicago and Mattoon, 4th; Sandwich, Windsor, and Charleston, 4th, 6th; Springfield, Cairo, Anna, Geneseo, Sycamore, and Bloomington, 6th; Collinsville, 21st, 22d; Bunker Hill, 22d.

Indiana.—Greencastle, 4th, 6th, 18th; Vevay, Jefferson, Sunman, and Spiceland, 6th; Indianapolis and Guilford, 6th, 7th; Fort Wayne, 6th, 7th, 17th; Laconia, 6th, 22d.

Iowa.—Keokuk, Burlington, Dubuque, Davenport, Independence, Monticello, Manchester, Des Moines, Oskaloosa, and Muscatine, 6th; Cedar Rapids, 6th, 8th.

Kansas.—Ninnescah, 3d, 4th; Allison, 3d, 5th, 30th; Independence and Yates Centre, 4th; Ottawa, 4th, 5th, 18th; Fort Scott, 17th; Wyandotte, 21st.

Kentucky.—Louisville, 6th; Richmond, 7th, 22d.

Louisiana.—Grand Coteau, 1st, 5th, 6th; Shreveport, 4th, 5th, 6th; New Orleans, 5th.

Maryland.—Ocean City, 8th.

Michigan.—Thornville, 5th; Grand Haven, 6th; Manistique, 6th, 7th; Marquette and Mackinaw City, 7th; Escanaba, 17th.

Mississippi.—Vicksburg, 6th, 7th.

Missouri.—Pierce City, 3d to 6th; Conception, 5th; Centreville, 17th; Saint Louis, 22d.

New Jersey.—Atlantic City and Dover, 8th.

New York.—Mountainville, 8th.

North Carolina.—Fort Macon and Hatteras, 1st; Smithville, 1st, 7th; New River Inlet, 2d, 8th, 18th, 19th; Charlotte and Lenoir, 6th; Weldon and Kitty Hawk, 8th.

Ohio.—Fostoria, 5th; Cincinnati, Sandusky, North Lewisburg, Wauseon, Yellow Springs, and Napoleon, 6th; Columbus, Cleveland, Toledo, Hiram, and Garrettsville, 7th.

Oregon.—Albany, 3d, 4th, 5th; Bandon, 17th, 24th.

Pennsylvania.—Blooming Grove, 8th.

South Carolina.—Stateburg, 1st, 6th, 7th, 18th; Aiken, 6th, 7th; Spartanburg, 6th, 7th, 8th, 10th, 22d.

Tennessee.—Milan, 5th, 6th, 7th, 18th; Nashville, 6th, 7th; Chattanooga, 6th, 7th, 18th, 22d; Ashwood, 6th, 18th; Knoxville, 6th, 22d.

Texas.—New Ulm, 1st, 3d, 4th, 6th; San Antonio, 3d, 4th; Palestine, 3d, 4th, 5th; Galveston, 3d, 4th, 27th; Cleburne, 4th, 5th, 6th; Rio Grande City, 7th; Brownsville, 27th.

Virginia.—Variety Mills and Wytheville, 6th; Chincoteague and Dale Enterprise, 8th.

Washington Territory.—Pysht, 7th, 8th, 26th; Tatoosh Island, 8th.

West Virginia.—Parkersburg, 6th.

Wisconsin.—Embarras and Manitowoc, 6th; Milwaukee, 6th, 7th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories, as follows:

Arizona.—1st.

Arkansas.—3d, 17th, 26th.

California.—1st to 4th, 6th, 7th, 23d, 26th, 27th.

Colorado.—14th.
 Dakota.—2d, 9th, 30th.
 Florida.—4th to 7th, 9th, 13th, 21st.
 Georgia.—21st.
 Illinois.—3d, 11th, 21st.
 Indiana.—7th, 12th, 17th.
 Iowa.—3d, 4th.
 Kansas.—3d, 10th, 14th.
 Massachusetts.—12th, 14th, 30th.
 Michigan.—6th, 11th, 17th, 19th, 24th.
 Minnesota.—9th.
 Missouri.—8th.
 Nevada.—11th.
 New Jersey.—14th, 17th.
 New York.—6th, 14th, 21st.
 Ohio.—7th, 11th, 12th, 17th, 29th.
 Pennsylvania.—12th, 22d, 30th.
 South Carolina.—1st, 4th, 11th, 20th.
 Tennessee.—3d, 7th, 11th, 12th, 16th, 17th.
 Texas.—7th to 10th, 14th, 17th to 20th, 22d, 24th.
 Utah.—18th.
 Virginia.—5th, 12th.
 Wisconsin.—11th, 17th, 24th, 30th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows:

Alabama.—19th, 21st.
 Arizona.—11th, 12th, 15th, 16th, 18th, 22d, 24th, 25th.
 Arkansas.—16th, 25th, 26th.
 California.—14th, 26th, 27th.
 Colorado.—12th, 15th, 16th, 18th.
 Connecticut.—12th, 17th.
 Dakota.—16th, 18th to 22d, 29th.
 District of Columbia.—17th, 18th.
 Florida.—13th to 17th, 20th to 24th.
 Georgia.—17th.
 Idaho.—13th, 15th.
 Illinois.—19th, 21st.
 Indiana.—10th, 11th, 17th, 18th, 20th, 21st, 26th.
 Iowa.—16th, 21st.
 Kansas.—7th, 10th, 12th to 16th, 20th, 22d, 26th.
 Maine.—15th, 19th, 21st.
 Maryland.—17th, 18th, 21st.
 Massachusetts.—12th, 14th, 17th, 18th.
 Michigan.—16th, 17th, 19th, 27th.
 Minnesota.—16th, 19th, 20th, 23d, 24th.
 Missouri.—26th, 27th.
 Montana.—12th to 16th, 21st.
 Nebraska.—14th, 15th, 17th.
 Nevada.—15th, 21st.
 New Jersey.—9th, 11th, 12th, 16th, 17th, 18th.
 New Mexico.—16th, 18th, 19th, 22d, 24th, 25th.
 New York.—12th, 15th, 17th, 18th, 20th to 25th, 27th, 28th, 30th.
 North Carolina.—16th, 17th, 19th.
 Ohio.—17th, 21st.
 Oregon.—14th, 22d, 28th.
 Pennsylvania.—12th, 15th, 17th.
 Rhode Island.—12th, 15th, 17th, 18th.
 South Carolina.—15th.
 Texas.—10th, 11th, 13th to 25th, 30th.
 Utah.—13th, 14th, 15th.
 Vermont.—21st.
 Virginia.—10th, 11th, 16th, 17th, 18th, 20th, 22d, 24th, 26th.
 Washington Territory.—20th, 22d.
 Wisconsin.—15th, 19th, 21st, 24th.

The phases of the moon during November were: new moon, 6th, 3.57 p. m.; first quarter, 14th, 4.53 p. m.; full moon, 22d, 4.33 a. m.; last quarter, 28th, 8.51 p. m.; apogee, 12th, 9.06 p. m.; perigee, 24th, 8.30 p. m.

MIRAGE.

Marquette, Nebraska, 9th, 14th, 21st.
 Reidsville, North Carolina, 1st, 10th, 15th, 23d.

MISCELLANEOUS PHENOMENA.

SUN SPOTS.

Prof. David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for November, 1885:

Date— November, 1885.	No. of new.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
3, 11 a. m.	0	0	0	0	0	0	3	12	
4, 2 p. m.	0	0	0	0	0	0	3	7	
5, 12 m.	1	15†	0	0	0	0	3	25†	
10, 10 a. m.	0	0	0	0	0	0	4	60†	
11, 4 p. m.	1	2	0	0	0	0	5	50†	
13, 8 a. m.	2	20†	0	0	0	0	4	35†	
15, 1 p. m.	0	25†	1	5†	0	0	3	60†	
17, 10 a. m.	2	15†	0	0	1	10†	5	70†	
20, 9 a. m.	0	0	0	0	0	0	4	40†	
27, 12 m.	0	0	0	0	0	0	0	0	
29, 10 a. m.	1	3	0	0	0	0	1	3	

Faculae were seen at the time of every observation.

† Approximated.

Mr. H. D. Gowey, of North Lewisburg, Champaign county, Ohio, reports having observed sun spots on the following dates: 3d, 7th, 10th, 13th, 16th, 21st, 25th, 29th.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-two stations show 4,829 observations to have been made, of which four were reported doubtful; of the remainder, 4,825, there were 4,293, or 89.0 per cent., followed by the expected weather.

EARTHQUAKES.

Helena, Montana, 11th: an earthquake shock occurred at 11.58 a. m., of about three seconds' duration.

FOREST AND PRAIRIE FIRES.

Fort Sill, Indian Territory: extensive prairie fires prevailed in this vicinity on the 5th, destroying about six hundred cords of wood.

Dallas, Texas, 23d: reports state that on the 21st about 8,000 acres of excellent grazing land in Mountain Creek Valley were burned over, causing heavy losses to farmers. The damage is estimated at \$20,000.

Wellington, Kansas: from the 5th to 25th prairie fires were numerous. To the southward of this station, in the Indian Territory, large areas from fifty to seventy miles in length were burned over, destroying large quantities of hay, and leaving pastures bare.

Wichita Falls, Texas, 21st: it is reported that prairie fires have burned over an extensive area in the vicinity of Red River Station, causing losses to cattle men, estimated at \$400,000.

Little Rock, Arkansas: from the 15th to the 23d forest fires caused considerable damage in various parts of this state. In Cross county farms were devastated, and people compelled to leave their homes for places of safety.

Forest and prairie fires were also reported from the following stations:

Hatteras, North Carolina, 26th.
 Saint Vincent, Minnesota, 1st, 2d.
 Fort Reno, Indian Territory, 5th, 7th, 9th to 16th, 18th, 19th.
 Fort Supply, Indian Territory, 3d, 5th, 10th, 15th, 19th.
 Fort Sill, Indian Territory, 1st, 3d, 4th, 7th, 9th to 12th.
 Abilene, Texas, 2d.
 Midland, Texas, 15th, 17th.

INSECTS.

Helena, Montana: at 10 p. m. on the 19th a dense swarm of grasshoppers filled the air; they appeared in such numbers

that, in falling against the roofs and windows, the noise resembled that caused by heavy rain.

METEORS.

The chief officer of the s. s. "British Prince" reports that on November 5th, at 6.30 p. m., in latitude $46^{\circ} 26' N.$, longitude $49^{\circ} 00' W.$, he saw a large meteor (with two distinct nebulae, each as large as Venus, in appearance) rise from the horizon in the southwest, and move slowly towards the southeast, where it disappeared behind a dense cloud. It was in sight fully ninety seconds, and its track looked like the trail of a comet. Its greatest altitude was near Venus, at which point the nebulae merged into one.

Buckfield, Maine: meteors were observed during the evenings of the 12th, 17th, and 27th; on the last-named date seventy-five were counted in about twenty minutes.

Portland, Maine: a large number of meteors were observed from 8 p. m. of the 27th until midnight; a similar display occurred on the following night.

Nashville, Tennessee: numerous small meteors were observed during the nights of the 25th, 26th, and 27th.

Fort Myer, Virginia: three meteors were observed in the northeast at 3 a. m. on the 6th; at 8.45 p. m. on the 10th a very bright meteor appeared in the southern sky, leaving a bright path, which remained visible for some time.

Pierce City, Missouri: very bright meteors were observed in the west during the evening of the 7th; they moved from south to north.

"Science" of December 4th, 1885, under the heading "Letters to the editor," contained the following:

On Friday, November 13th, about 10.30 a. m., the attention of a number of our students was attracted by a brilliant meteor. The appearance, as described by Mr. H. Toulmin, of the senior class, is as follows: The path of the meteor began 15° or 20° west and north of the zenith, following a northwesterly direction, and ending some 20° from the horizon. The brightness he compares to that of Venus when seen at night. The sun was shining brightly, and no clouds were noticed. No explosion was heard, nor did any fragments seem to reach the ground.

C. L. DOOLITTLE.

Lehigh University, Pennsylvania.

Webster, Dakota: meteors were observed on the 10th, 12th, and 27th. Those seen on the last-mentioned date were very numerous, and flashed in all directions; in less than ten minutes more than seventy were counted, and, of that number, about twenty were equal to stars of the first magnitude.

New London, Connecticut: between 5.15 and 6.10 p. m. on the 20th one hundred and twenty-four meteors were observed, some of which were very brilliant. Nearly all of the meteors emanated from the triangle formed by Polaris, Cepheus, and Perseus, and their general course was towards the southwestern horizon.

New York City: an unusually large number of meteors were observed from 7 to 9 p. m.; they appeared to proceed from Andromeda, near the foot; many of them were quite large and brilliant.

Westborough, Massachusetts: at 7 p. m. on the 27th a large number of shooting stars were observed.

Fall River, Massachusetts: a fine meteoric display occurred on the evening of the 27th; one, noted at 9.30 p. m., was especially bright, and moved from near the zenith in a northwesterly direction, leaving a long train, which remained visible for several minutes.

Gardiner, Maine: at 6 p. m. on the 27th a brilliant meteoric shower was observed in the southwest.

Cambridge, Massachusetts: during the early evening of the 27th numerous meteors were observed radiating from Andromeda.

Windsor, Illinois: a brilliant meteoric display was observed during the evening of the 27th and until 2 a. m. of the 28th.

Muscataine, Iowa: a large number of small meteors were observed during the evening of the 27th.

Cahuenga, California: numerous meteors were observed during the evening of the 26th; at times as many as three were observed at the same moment. The general movement

was toward the south, and many were brighter than stars of the first magnitude. During the week following the above date meteors were of unusual frequency.

North Colebrook, Connecticut: numerous meteors, moving in a northwesterly direction, were observed during the evening of the 27th.

Meteors were also observed during the month in the various states and territories, as follows:

Arizona.—Prescott, 27th.

Arkansas.—Lead Hill, 9th, 19th.

California.—San Rafael, 27th.

Connecticut.—New Haven, 16th; Bethel, 26th, 27th.

Dakota.—Webster, 10th, 12th.

Florida.—Archer, 1st, 27th.

Illinois.—Anna, 25th; Geneseo and Charleston, 26th.

Indiana.—Vevay, 10th, 28th; Spiceland, 25th.

Indian Territory.—Fort Sill, 10th.

Iowa.—Cedar Rapids, 9th, 10th, 11th, 20th; Monticello, 10th, 14th, 15th, 24th; Davenport, 25th, 26th, 27th.

Kansas.—Fort Scott, 2d; Allison, 3d, 4th, 8th; Elk Falls, 20th; West Leavenworth, 23d, Topeka, 26th, 27th, 28th; Ottawa, 27th.

Maine.—Portland, 28th.

Maryland.—Woodstock, 28th.

Massachusetts.—Cambridge, Somerset, and Westborough, 27th; Taunton, 27th, 28th; Williamstown, 27th, 28th, 29th; Rowe, 27th, 29th; Blue Hill and Milton, 29th.

Minnesota.—Northfield, 26th.

Nebraska.—Howard, 4th; Crete, 7th, 9th, 25th, 27th.

New Hampshire.—Nashua, 27th.

New Jersey.—Dover, 26th, 27th; Moorestown and Readington, 27th.

New York.—North Volney and Mountainville, 27th.

Ohio.—Wauseon, 11th, 12th, 27th, 29th, 30th.

Pennsylvania.—Wellsborough, 14th; Fallsington, 26th, 27th; Dyberry, Washington, and Quakertown, 27th.

South Carolina.—Stateburg, 1st.

Texas.—Cleburne, 2d, 30th.

Virginia.—Fort Myer, 6th; Dale Enterprise, 13th; Variety Mills, 26th.

MIGRATION OF BIRDS.

Geese flying southward.—Mobile, Alabama, 13th; Lead Hill, Arkansas, 7th; Little Rock, Arkansas, 9th, 15th; Sacramento, California, 1st to 10th; Fort Bidwell, California, 4th, 6th; Red Bluff, California, 5th, 9th; Fort Yates, Dakota, 9th; Fort Sully, Dakota, 11th; Cœur d'Alene, Idaho, 13th, 14th; Cairo, Illinois, 5th, 6th; Charleston, Illinois, 8th; Keokuk, Iowa, 8th; Davenport, Iowa, 12th; Yates Centre, Kansas, 2d, 7th, 27th, 28th; West Leavenworth, Kansas, 2d, 5th, 6th, 7th, 9th, 11th, 12th, 15th, 16th, 19th, 23d; Fort Scott, Kansas, 3d; Buckfield, Maine, 9th, 22d; Ocean City, Maryland, 1st; Lamar, Missouri, 7th, 12th; Fort Assinaboine, Montana, 29th; Saint Louis, Missouri, 8th, 11th; North Platte, Nebraska, 12th, 15th; Winnemucca, Nevada, 5th; Humphrey, New York, 1st, 17th; Garrettsville, Ohio, 13th; Chambersburg, Pennsylvania, 13th; Hiram, Ohio, 14th, 16th; Albany, Oregon, 2d, 8th; Portland, Oregon, 4th, 26th; Astoria, Oregon, 16th, 18th; Brownsville, Texas, 1st; Charlotte, Vermont, 26th; Parkersburg, West Virginia, 1st; Tatoosh Island, Washington Territory, 1st, 5th, 9th, 10th, 14th, 15th, 16th, 29th.

Geese flying northward.—Little Rock, Arkansas, 9th; Wauseon, Ohio, 13th.

Geese flying westward.—Little Rock, Arkansas, 13th.

Geese flying eastward.—Cleveland, Ohio, 13th.

Ducks flying southward.—Little Rock, Arkansas, 1st, 2d, 6th, 9th, 10th, 13th; Yates Centre, Kansas, 25th, 27th, 28th; Knoxville, Tennessee, 2d, 18th, 25th.

Ducks flying northward.—Indianola, Texas, 5th.

Ducks flying westward.—Abilene, Texas, 10th, 15th.

Cranes flying southward.—West Leavenworth, Kansas, 1st, 4th to 7th, 11th, 13th, 16th; Tatoosh Island, Washington Territory, 15th, 20th.

Brants flying southward.—West Leavenworth, Kansas, 5th, 7th, 8th, 9th, 12th, 17th, 19th, 23d.

POLAR BANDS.

Arkansas.—Lead Hill, 2d.
 Connecticut.—Bethel, 11th.
 Florida.—Archer, 7th, 8th, 9th, 12th, 13th, 17th, 24th, 25th;
 Limona, 1st, 4th.
 Illinois.—Riley, 10th, 16th, 17th.
 Kansas.—Yates Centre, 16th, 20th, 25th.
 New York.—Mountainville, 29th.
 Ohio.—Wauseon, 7th.
 Tennessee.—Nashville, 26th, 27th.
 Texas.—El Paso, 22d.
 Virginia.—Dale Enterprise, 20th.
 Wisconsin.—Prairie du Chien, 4th, 21st, 26th.

SAND STORMS.

Yuma, Arizona, 25th.
 Fort Union, New Mexico, 5th.

ERRATA.

On page 235, September, 1885, REVIEW, and also on page 262, October, 1885, REVIEW, in the "Tables of miscellaneous meteorological data," the decimal point throughout the column of departures from the normal pressure should be moved one place to the left; for example, the departure at Saint Paul, given, page 262, as -0.2 , should read -0.02 .

Meteorological record of voluntary observers and Army post surgeons, November, 1885.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

Stations.	Temperature.			Rainfall.	Stations.	Temperature.			Rainfall.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean.	
Alabama.	°	°	°	Inches	Georgia.	°	°	°	Inches
Birmingham *	77	25	52.0		Athens	70	29	49.9	3.71
Greensborough	76	31	55.1	7.32	Forsyth *	79	32	54.9	3.26
Arizona.					Quitman *	79	31		1.30
Tucson				0.44	Illinois.				
Arkansas.					Anna	76	28	47.8	1.80
Lead Hill *	81	30	49.8	2.50	Bunker Hill *	75	22	40.7	1.35
Mount Ida *	80	21	54.0	3.60	Collinsville	74	26	44.1	2.54
California.					Charleston *	69	20	41.0	2.61
Benicia Barracks	75	45	56.0	8.75	Geneseo	66	19	38.4	1.20
Bidwell, Fort	74	30	41.2	8.62	Mattoon *	69	22	43.0	2.20
Cahuenga Valley				7.45	Peoria *	68	26	42.8	1.04
College City	78	38	53.8	8.85	Riley *	60	23	35.8	2.09
Gaston, Fort	70	30	47.0	24.54	Rockford *	59	19	36.0	1.96
Hydeville				18.37	Sandwich *	66	20	39.4	1.89
Murieta *	80	27	54.5	5.15	South Evanston	65	20	37.0	1.87
Oakland *	72	43	50.8	11.11	Sycamore	62	21	39.0	2.06
Oroville *	74	42	57.1	11.27	Wilmington	68	19		2.34
Sacramento *	74	36	54.4	9.65	Windsor *	69	20	41.5	1.70
Salinas *	72	30	52.7	6.60	Indiana.				
San Rafael *	78	14		15.24	Fort Wayne *	72	28	43.0	4.25
Susanville	64	24	41.4	5.77	Guilford *	66	22	40.4	2.55
Colorado.					Jeffersonville	70	26	45.1	3.65
Lyon, Fort	80	30	43.1	0.20	Laconia *	76	26	45.0	3.64
Pueblo	76	30	42.4		Lafayette	68	18	39.8	2.33
Connecticut.					LaGrange *	68	24	38.5	3.20
Bethel				6.50	Logansport	74	25	44.5	2.92
Hartford	66	13	40.4	5.04	Mauzy *	67	15	37.6	2.35
North Colebrook *	70	6	41.0	3.46	Spiceland	68	19	42.0	1.80
Southington	70	11	40.5	3.53	Sunman *	67	20	41.4	3.12
Voluntown *	70	14		5.16	Terre Haute *	67	28	44.0	3.20
Dakota.					Vevay	71	25	40.5	2.64
Abr. Lincoln, Fort.	58	8	30.0	0.40	Iowa.				
Meade, Fort	66	20	40.2	0.93	Cedar Rapids *	60	16	35.6	0.65
Pembina, Fort	44	3	26.0	0.90	Cedar Rapids *	14		32.0	0.58
Randall, Fort	66	9	36.8	1.48	Cresco *	55	14	32.4	0.39
Simsen, Fort	50	5	26.4	1.70	Des Moines	57	17	39.5	
Sully, Fort	55	13	33.5	0.20	Independence *	54	21	35.6	0.26
Totten, Fort	45	4	20.4	0.97	Logan *	64	16	39.6	1.00
Vermillion	72	13	39.0	1.54	Madison, Fort *	66	23		0.53
Webster *	52	10	31.4	1.17	Manchester	60	20	37.0	0.29
Yates, Fort	58	8	31.8	0.14	Monticello	61	17	35.2	0.61
District of Columbia.					Mount Vernon *	63	20	37.6	
Distributing Reserv.	70	26	46.6	3.47	Muscataine *	65	18	37.1	0.83
Receiving Reserv.	69	29	45.6	3.47	Oakaloosa *				0.31
Rock Creek Bridge *	74	31	48.8		Oakaloosa *	67	14		
West Washington	70	28	42.7	3.05	Kansas.				
Florida.					Allison *	80	22	40.8	0.52
Archer	80	28	50.1	1.41	Atchison *	76	21	41.2	1.07
Limona *	87	30	63.3	0.52	Elk Falls *	56	25		1.75
Manatee *	89	40	64.8	0.22	Emporia *	75	25		0.95
Merritt's Island	82	41	59.9	0.42	Fort Scott	72	22	45.6	0.50
Saint Augustine, Ft	82	33	61.2	0.52	Independence *	78	23	47.9	0.58
Tallahassee *	77	30	62.0	2.65	Manhattan	74	22	43.9	0.30

Meteorological record of voluntary observers, etc.—Continued.

Temperature.					Temperature.				
Stations.	Maximum.	Minimum.	Mean.	Rainfall.	Stations.	Maximum.	Minimum.	Mean.	Rainfall.
<i>Kansas—Cont'd.</i>					<i>New Jersey—Cont'd.</i>				
Ninnescah*.....	76	12	45.9	0.53	Readington*.....	72	26	47.5	3.80
Ottawa.....				1.50	Somerville*.....	68	24	42.9	3.99
Sterling*.....	76	23	43.2	0.90	South Orange*.....	76	30	44.5	4.10
Topeka*.....	78	19	45.4	0.86	Vineland.....	74	30	45.7	4.01
Wellington*.....	78	30	45.2	1.02	<i>New Mexico.</i>				
W. Leavenworth.....	76	25		2.20	Gallinas Spring.....	67	34		0.25
Westmoreland*.....	70	20	43.0	0.38	Union, Fort.....	75	10	42.9	0.10
Wyandotte*.....	74	21	47.6	1.52	Wingate, Fort.....	70	18	40.5	1.46
Yates Centre*.....	49	20	48.2	0.74	<i>New York.</i>				
<i>Kentucky.</i>					Auburn.....	68	21	38.9	2.38
Richmond.....	71	26	44.4	3.00	Cooperstown*.....	68	15	27.7	3.95
<i>Louisiana.</i>					David's Island.....	66	24	45.2	2.20
Grand Coteau.....	82	34	62.1	4.02	Factoryville*.....	70	10	38.4	2.24
Liberty Hill*.....	79			2.31	Humphrey.....	60	25	35.1	2.71
Luling*.....	79	31		4.95	Ithaca.....	70	9	39.4	2.77
Point Pleasant*.....	84	25	53.7	0.97	LeRoy.....	68	20	39.8	2.39
<i>Maine.</i>					Madison Barracks.....	71	5	38.8	2.32
Bar Harbor.....	68	25		3.88	Mendon Station*.....	67	17	39.7	3.34
Buckfield.....				3.91	Mountainville.....	70	7	40.4	0.22
Cornish*.....	54	10	35.8	5.93	Niagara, Fort.....	63	25	41.6	1.96
Gardiner.....	58	16	38.6	2.80	North Volney*.....	67	15	39.2	2.95
Kent's Hill.....	58	19	35.9	4.15	Palermo*.....	73	15	36.7	2.50
Orono*.....	59	14	36.4	5.37	Palmira*.....	74	22		1.60
Preble, Fort.....	57	20	40.7	1.09	Penn Yan.....				
Waterville.....	61	15	39.4		Plattsburg Bks.....	62	3	35.8	4.39
<i>Maryland.</i>					Setauket.....	67	27	45.9	8.16
Cumberland.....	66	25	42.5	1.73	West Point.....	70	16	41.7	5.70
Fallston*.....	70	28	43.7	4.08	White Plains.....	68	20	44.3	2.90
Great Falls*.....	70	25	44.0	3.30	<i>North Carolina.</i>				
McDonogh.....	69	27	43.4	4.02	Asheville.....	80	25	44.0	4.80
McHenry, Fort.....	70	33	47.9	3.66	Lenoir*.....	66	22		5.20
Woodstock.....	78	23	43.1	4.93	Lincolnton*.....	64	33	45.5	0.29
<i>Massachusetts.</i>					Raleigh.....	79	29	50.5	1.10
Amherst*.....	67	15	41.9	5.65	Reidsville*.....	70	25	44.5	8.40
Amherst b.....	70	11	39.8	5.54	Statesville*.....	71	31	48.9	4.96
Blue Hill.....	65	19	40.8	4.35	Wake Forest*.....	65	28	52.1	2.08
Deerfield.....	69	9	36.8	0.99	Weldon.....	80	29	48.2	2.33
Dudley.....	65	20	40.3	4.12	<i>Ohio.</i>				
Fall River*.....	64	27	43.7	3.10	Cincinnati*.....	73	28	45.1	2.57
Heath*.....	64	14		41.1	Cleveland*.....	68	23	41.6	5.25
Mendon*.....	67	18		41.1	Clyde*.....	66	24	40.7	
Milton.....	67	18	42.4	6.10	Fostoria*.....	66	23	38.0	
New Bedford.....	68	23	44.1	3.07	College Hill*.....	74	25	43.6	2.75
Princeton.....	62	18	37.5	0.69	Garrettsville.....	67	13	37.8	3.14
Rowe*.....	62	13	35.8	5.55	Hiram.....	65	21	38.7	3.73
Somerset*.....	68	20	44.8	3.10	Jacksonborough*.....	70	20	41.1	2.35
Taunton.....	71	19	44.4	3.26	Napoleon*.....	68	19	41.7	2.71
Westborough*.....	72	12	42.5	0.14	North Lewisburg.....	67	21	40.2	2.25
Williamstown.....	72	10	39.0	3.97	Ruggles*.....	66	14	31.67	2.20
Worcester*.....	65	12	39.2	5.96	Tiffin.....	69	23	38.9	2.89
<i>Michigan.</i>					Wauseon.....	69	16	38.5	2.73
Birmingham.....	61	22		2.66	Westerville.....	68	21	40.1	2.23
Bozeman.....	60	17	30.1	2.33	Yellow Springs*.....	69	23	41.4	2.36
Brady, Fort.....	53	20	34.0	3.00	<i>Oregon.</i>				
East Saginaw.....	64	24	39.1	2.71	Albany*.....	65	34	47.3	8.40
Harrisville*.....	60	20		1.32	Bandon*.....	60	32	47.7	18.21
Hudson.....	67	14		3.28	East Portland*.....	68	31		4.01
Kalamazoo.....	63	25		3.11	Eola*.....	57	34	45.8	7.36
Lansing.....	64	21	38.2	3.05	<i>Pennsylvania.</i>				
Manistique.....	58	22	35.9	3.70	Altoona.....	69	19	43.8	1.92
Mottville*.....	62	18		2.25	Bethlehem.....	70	20		4.28
Pentwater.....	62	23	38.3	1.19	Bloomington*.....	67	8		3.20
Thornville.....	68	28	39.8	4.90	Catawissa.....	71	12	41.2	4.05
Traverse City*.....	55	23		2.85	Chambersburg*.....	70	29	43.4	1.51
<i>Minnesota.</i>					Drifton.....	72	12	37.4	5.46
Minneapolis*.....	52	15	32.5	1.00	Dyberry*.....	67	2	37.8	4.41
Snelling, Fort.....	55	11	34.0	0.80	<i>Easton a</i>				
<i>Missouri.</i>					Easton b.....	70	29	48.8	
Carthage.....	79	18	49.3	0.84	Fallsington.....	70	26	43.2	3.58
Centerville.....	71	14		2.72	Franklin*.....	64	10	34.5	3.33
Conception.....	69	20	39.8	0.60	Germantown*.....	70	26		3.86
Pierce City*.....	78	19	47.0	2.40	Grampian Hills*.....	64	4	33.8	3.73
Springfield.....	79	22	41.6	2.05	Mahanoy Plane*.....	67	13	41.6	0.78
<i>Montana.</i>					Quakertown a.....	67	21	39.8	
Assinaboine, Fort.....	72	11	39.3	0.03	Quakertown b.....	64	20	40.1	4.23
Ellis, Fort.....	70	6	38.0	1.10	South Bethlehem.....	71	16	41.9	3.66
Keogh, Fort.....	67	3	38.9	1.06	Troy.....	65	5	38.2	2.67
Shaw, Fort.....	64	9	42.0	0.03	Washington.....	68	16		4.00
<i>Nebraska.</i>					Wellsborough*.....	70	22	41.4	2.62
Crete.....	72	19	37.5	0.72	West Chester.....	68	26	42.6	4.71
De Soto*.....	62	17	36.8	1.34	Wilkesbarre*.....	72	12	39.7	5.15
Fremont.....	67	18	35.8	1.38	Wysox.....	66	13	39.5	2.66
Genoa.....	66	91	37.1	1.32	<i>South Carolina.</i>				
Harvard.....	64	23		1.50	Aiken*.....	79	30	53.6	1.03
Marquette*.....				0.81	Kirkwood*.....	70	25	46.3	1.83
Robinson, Fort.....	74	11	40.7	1.70	Pacolet*.....	68	29	47.8	3.22
Stockham*.....	72	38		1.05	Spartanburg*.....	54	8	27.0	5.50
Tecumseh*.....	72	16	40.3	0.63	Stateburg*.....	70	31	52.9	1.45
Yutan*.....	68	20	37.5	1.02	<i>Tennessee.</i>				
<i>Nevada.</i>					Ashwood*.....	68	25	46.5	3.10
Carson City.....	72	15	42.2	4.73	Milan.....	80	23	48.6	3.06
McDermitt, Fort.....	65	18	38.7	1.82	<i>Texas.</i>				
<i>New Hampshire.</i>					Austin*.....	83	34	60.7	1.17
Antrim.....				6.50	Brown, Fort.....	88	40	70.0	0.00
Antisacoook*.....	64	1	38.5	5.40	Cleburne.....	81	22	53.5	1.38
Nausha.....	67	10	39.2	4.20	Comfort.....				0.44
<i>New Jersey.</i>					Concho, Fort.....	88	25	57.8	0.00
Beverly*.....	73	26	44.3	3.59	Corpus Christi*.....	92	51		
Clayton*.....	72	27	43.4	3.76	Coriscana.....				2.40
Dover.....	68	18	40.8	7.90	Huntsville*.....	83	34		2.26
Moorestown.....	72	25	43.0	3.77	Midland.....	85	23	53.8	0.01
Princeton.....	70	20	43.5	2.72	New Ulm.....	89	62	61.2	0.69

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature.			Rainfall.	Stations.	Temperature.			Rainfall.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean.	
Vermont.	°	°	°	Inches	Virginia—Cont'd.	°	°	°	Inches
Brattleborough	64	6	38.2	5.64	Wytheville	68	24	44.9	2.56
Burlington	67	6	38.9	3.94	Washington Territory.				
Charlotte*	66	8	36.2	5.20	Bainbridge Island*	60	35	47.5	8.04
Dorset	71	9	37.0	3.69	Kenewick*	61	20	.....	0.99
Lunenburg	70	10	35.6	2.53	Pleasant Grove*	58	20	.....	1.59
Newport*	65	5	34.9	3.97	Tacoma*	60	34	45.5	8.22
Post Mills Village*	69	—	33.7	.....	West Virginia.				
Stratford	65	8	34.7	4.30	Helvetia*	70	26	39.6	4.06
Woodstock	62	—10	34.5	4.53	Parkersburg	70	27	41.6	0.16
Virginia.					Wisconsin.				
Accotink*	75	38	47.1	2.88	Embarras*	52	20	35.7	2.65
Bird's Nest*	74	33	51.9	5.80	Manitowoc	54	19	38.2	1.87
Brumton .....			.....	3.05	Prairie du Chien*	60	16	36.6	0.80
Dale Enterprise*	72	28	45.5	4.05	Wausau	46	26	31.9	1.07
Marion*	69	25	43.2	2.18	Wyoming.				
Monroe, Fort	75	35	50.8	5.14	Bridge, Fort	56	6	33.4	0.08
Snowville*	70	22	.....	.....	Fred Steele, Fort	64	4	35.0	0.20
Variety Mills*	69	19	43.5	2.85					

NOTES AND EXTRACTS.

The following extract is from the November, 1885, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., Auburn:

The tornadoes that occurred on the 6th were the only unusual features of the month that call for special note.

The temperature was normal, and the precipitation was about the average.

State summary.

Mean temperature, 52° 5; highest temperature, 85°, at Mount Willing, on the 6th; lowest temperature, 18°, at Gadsden, on the 26th; range of temperature, 67°; greatest monthly range of temperature, 61°, at Gadsden; least monthly range of temperature, 42°, at Chattanooga; mean daily range, 16° 1; greatest daily range of temperature, 34° 5, at Florence, on the 3d; least daily range of temperature, 0°, at Mount Willing, on the 29th.

Mean depth of rainfall, 4.41 inches; mean daily rainfall, 0.147; greatest depth of monthly rainfall, 7.90 inches, at Marion; least depth of monthly rainfall, 2.23, at Mount Willing; greatest daily rainfall average for state, 1.63 inches, on the 6th; greatest daily local rainfall, 6.00 inches, at Marion, on the 6th.

Average number of days on which rain fell, 8; average number of cloudy days, 12; average number of fair days, 6; average number of clear days, 12; warmest day, 6th; coldest day, 26th.

Prevailing direction of wind, northwest.

The following meteorological summary and accompanying remarks are from the November, 1885, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly mean.	
Northern counties	°	°	°	Inches.
Central counties	74.0	21.0	39.95	2.38
Southern counties	70.0	15.0	40.78	2.55
State	76.0	20.0	44.37	2.78
State	76.0	15.0	42.03	2.59

The mean temperature of the state for November, 1885, is 1° 24 above that for last year; 0° 76 above the mean of fourteen years at Indianapolis; 1° 45 above the mean of twenty-six years at Logansport; 1° 67 below the mean of twenty-one years at Vevay; 4° 13 above the mean of six years at Maury; 1° 82 below the mean of eight years at Blue Lick; 4° 20 below the mean of four years at Worthington, and 4° 49 above the mean of six years at this station. With two exceptions the temperature at the various stations is above the mean, the amounts ranging from 0° 3 to 2° 8.

The mean precipitation for the state is 0.87 inch above that for November of last year; 1.06 inch below the mean of fourteen years at Indianapolis; 0.24 inch below the mean of twenty-one years at Vevay; 1.01 inches below the mean of six years at Maury; 0.56 inch below the mean of four years at Blue Lick; 0.88 inch below the mean of four years at Worthington, and 0.37 inch below the mean of six years at this station. The precipitation at all stations, excepting Logansport, is below the normal.

While the precipitation has been below the normal, the cloudiness has been nearly double the normal.

One lunar and one solar halo, one aurora, and two lunar coronæ are reported.

The thunder-storm of the 6th was general throughout the state, and most severe in Gibson county. It was followed by high southwest to west winds.

The following meteorological summary and accompanying remarks are from the November, 1885, report of the "Indiana Weather Service," under direction of Prof. W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
Northern counties	°	°	°	Inches.
Central counties	74.0	21.0	39.5	2.73
Southern counties	70.0	15.0	40.8	2.66
State	76.0	20.0	43.5	2.95
State	76.0	15.0	41.3	2.77

The weather was, as a whole, remarkably favorable for out-door work. All kinds of crops were sheltered in good condition. Wheat looks well. Grass was unusually good.

The temperature average for the month was a little high, being 2° 6 above the normal at Logansport; 3° 5 above at Spiceland; 1° 1 above at Indianapolis; 2° 8 above at Vevay; and for the state 0° 9 lower than in 1882; 1° 9 lower than in 1883; 1° 2 higher than in 1884, and 0° 4 lower than the average for the four years. The highest station mean was 46° 5, at Vevay and Marengo; lowest, 37° 6, at Maury; highest maximum, 76°, at Marengo; lowest minimum, 15°, at Maury; state range, 61°; average station range, 44° 9; greatest, 52°, at Maury; least, 36°, at La Grange.

The rainfall was rather more evenly distributed than usual through the month and over the state, ranging from 18.56, on the 6th, to none, on the 3d, 9th, 10th, 15th, 16th, 20th, 24th, 25th, 26th, 27th, 29th, 30th, and from 4.82, at Marengo, to 1.00, at Fort Wayne. The average was greatest for southern stations and least for central, with very small difference between the sections. For the fall the greatest rainfall was 16.64, at Marengo, and the least, 5.76, at Spiceland.

The following is an extract from the "Iowa Weather Bulletin" for November, 1885, prepared under direction of Dr. Gustavus Hinrichs, Iowa City:

November, 1885, was very equable, mild, fair and dry, northwesterly and southeasterly winds prevailing. No measurable snow fell, and the night temperature did not fall below 20° Fahrenheit at the central station—only once since 1870, have the nights of November been as mild (in 1878). With nearly normal mean cloudiness, the evenings were generally fair. Many days, especially during the second half of the month, were fine and hazy—greatly favoring the late fall work, especially the husking of the thoroughly ripened and plentiful crop of corn.

The mean temperature of the air was nearly two degrees above normal. This is the fourth November which has been from one half to two degrees above normal in temperature. While the first decade was cold, the last two decades were nearly four degrees above their normal temperature.

The total rainfall was only about half the normal in amount, and occurred mainly during the first decade. The heaviest rain fell on the 5th and during the thunder-storm of the 6th. No real snow storm has yet visited Iowa this fall—the flurry of snow of the 12th and 30th was scarcely measurable in a few places.

While we have had no wind storms, the total run of the wind has been about twelve per cent. above the average.

The most notable phenomena were the fine, hazy days of the latter half of the month, and the frost-coated vegetation on the 25th and 26th, in eastern Iowa. Northern lights were seen on the 9th, at several stations in the north-east, and on the 3d, at Saint Ansgar.

The fall season just closed has been exactly normal in its mean temperature; the excess of the second and third decades of September and November exactly balancing the deficiencies of the other four decades, while the middle decade of October was normal. The greatest departure from normal occurred during the first decade of September, and amounted to over ten degrees, but cloudy sky on the 6th prevented frost. The entire fall season has been favorable to the farmer.

The winter now begun augurs to be a moderate one, both according to the full series of observations since 1839, and also according to the special character of the winters in Iowa since 1870.

The following is an extract from the November, 1885, report of the "Minnesota Weather Service," under direction of Prof. Wm. W. Payne, Northfield:

The month has been noticeably free from atmospheric disturbances, storms and gales being few in number and of little energy, the movement of wind being at least one-third less than the average, Bird Island having 8,470 miles, the greatest, and Red Wing 3,762 miles, the least, number of miles traveled by the wind for the month. The greatest hourly velocity of the wind was at Duluth, on the 7th, when a gale of forty-four miles per hour did much damage to the shipping and other interests. The severe drouth produced in the west-

ern part of the state by the deficiency of rainfall through the summer still exists, and will probably not be broken before the thaws of another spring. The precipitation has again been very light at the headwaters of the Mississippi, and if the winter should prove to be a cold one, holding back the water in the small streams, very low water may be certainly looked for.

Temperature.—Reports from nineteen stations of the Minnesota Weather Service give an average mean temperature for Minnesota for November of 32°.1. This is 10°.1 colder than the preceding month of October. The warmest station was, as usual, La Crosse, with a mean temperature for the month of 38°.0. The next warmest was Winona, 35°.6. The highest temperature reported was at Sherburne, 62°.0. The coldest stations were Saint Vincent, Park Rapids, and Moorhead, 27°.6, 27°.7, 27°.8, respectively. The minimum degree of heat (0°.7) was observed at Saint Vincent, on the 13th. The highest temperatures, with few exceptions, were generally recorded on the 10th and 11th; the lowest on the 13th, in the northern sections, and on the 14th and 15th, in the south.

November this year has been distinguished throughout all sections over other months of the same name by its high mean temperature, and small monthly range of the same. At La Crosse the month was 5°.6 warmer than the average of the previous thirteen Novembers; at Duluth 3°.4 above the normal, and at Moorhead 3°.4 above the average of the past five Novembers.

An interesting feature has been the high minimum temperatures, no station reporting zero readings, a fact unusual in the meteorological history of the month in Minnesota, and contrasting strongly with November, 1884, when the lowest temperature ranged from -5°.0 to -25°.0, according to locality.

The lakes were generally free from ice until the 14th or 15th, when the moderately cold weather of those dates partially closed the lakes and smaller rivers. The mild, open weather has been very favorable for agricultural work, many farmers plowing up to the last day. Small quantities of floating ice were seen in the Mississippi and Minnesota Rivers on the 16th, but at the end of the month both of those streams were free from ice from the latitude of Saint Cloud to the southern boundary of the state.

The month has been remarkably mild and free from extremes throughout the Red River Valley, making it very favorable for agricultural work preparatory to the setting in of winter. The Red River at Moorhead was very low and only partially closed by ice at the end of the month.

La Crescent, 30th.—The month has been exceptionally fine and open, giving farmers abundant opportunity to finish fall work. There is no frost in the ground, and plowing was continued to the end of month. Pansies still in bloom, and pasturage good to end of month.

Albert Lea.—Mild and beautiful November; lakes partially frozen at end of month, and farmers still plowing.

Precipitation.—Though the normal for November in this latitude is not large, there was, as in the preceding month, a decided deficiency throughout all parts of the state. The only places reporting one inch or over are Saint Vincent, Duluth, Wadena, and Minneapolis. This was chiefly in the form of snow north and west of Saint Paul, and principally occurred on the 6th and 7th, on which dates the state was within the influence of a cyclone which originated at Las Animas, Colorado, during the night of the 5th, and after an erratic course was central in southeast Minnesota at 7 a. m. of the 7th, after which it rapidly passed to the east over the Lake region and Saint Lawrence Valley. From the 25th to 30th light falls of snow, sleet, and hail were frequent.

The following is an extract from the November, 1885, report of the "Nebraska Weather Service," under direction of Prof. Goodwin D. Swezey, of Doane College, Crete:

Weather for November.—The only marked feature of the temperature for November has been the lack of any days of extreme cold; the temperature has been on the whole about two degrees above the normal, more exactly 1°.8 for the mean and 1°.9 for the noon temperature. The number of days below the freezing point has been about normal, also the highest temperature of the month has been only four degrees above the average of that for the past years; the lowest temperature recorded anywhere by self-registering thermometers was but 18°.6, while in past years it has gone down nearly to zero, and in November of 1880 to seven degrees below zero.

The precipitation has been a little above normal, as also the number of rainy days and proportion of cloudy skies. The snowfall, on the contrary, has been small, and confined to the western part of the state. Hail and thunder-storms have been wholly wanting, although occurring in about one-half of the past Novembers.

Storms and cold waves.—One storm of considerable importance and two cold waves have been felt in Nebraska the past month. Cold-wave flags were ordered up for a cold wave that came on the 2d. On the 5th a storm-centre developed in Indian Territory and moved northward and northeastward, bringing the principal rainfall of the month here, and the lowest barometer since April, 1884, then passed over the Lake region, accompanied there by heavy winds, rain, and snow.

On the 11th another storm-centre formed in the Missouri Valley, which, although it did not bring rain here, caused a considerable fall of the barometer, and passed over the Lakes as before, producing high winds, rain, and snow; this was followed by the second cold wave, which caused a "norther" in some of the western states and territories as far south as Texas, with killing frosts

as far south as Louisiana; the cold wave then worked its way gradually eastward, causing killing frosts in Alabama and Georgia.

Precipitation.—The average rain for the different sections of the state for November, 1885, is as follows: Northeast section, 1.36 inches; southeast section, 0.43; northwest section, 1.38; southwest section, 1.16.

Miscellaneous.—The mean barometer during the month at Crete was 30.043; at Omaha, 30.042. The mean humidity was 77.7 at Crete; 80.1 at Omaha.

The following is an extract from the November, 1885, "Bulletin of the New England Meteorological Society," under direction of Prof. Winslow Upton, Providence, Rhode Island:

Reports for November, 1885, were received from one hundred and thirty-six observers.

General conditions.—The month was warm, with an excess of precipitation, a large number of cloudy days, and two storms of exceptional severity.

Precipitation.—The precipitation for the month was large. The reports show an excess over the usual November average, except at a few stations. The rainfall was especially abundant in the storms of the 1st-3d and 5-9th at nearly all stations, but in the storm of the 22d-26th the distribution was very irregular. But little snow was noted, except in the last-named storm, which was partly snow and rain. In the first storm the region of greatest precipitation was in southwestern Connecticut and Long Island, and in the last storm in eastern Massachusetts. In the latter more than four inches of rain and melted snow was recorded at Cambridge, Medford, Mystic Lake, Newburyport, and South Hingham.

Temperature.—The temperature was at no station below the normal, and averages 2°.5 above the usual value. The first half of the month was especially warm, the colder weather of the closing days tending to reduce the average.

Pressure.—The monthly average pressure was fully one-tenth of an inch below the normal. This was due to the lack of any especially high areas, and to the persistently low pressure which prevailed between the 8th and 16th and again between the 20th and 26th. The barometric depressions were well marked and in two instances attended by severe storms. In the first of these, on the 2d, much damage was done from wind, especially to shipping at anchor in the harbors. The rain was also of unusual quantity, as elsewhere noted.

The second severe storm of the month occurred from the 23d to the 26th. A barometric depression which had reached the Virginia coast from the west moved slowly in a northeasterly direction along the coast, turning easterly from the southern coast into the Atlantic on the 26th. On its approach the wind blew strongly from the northeast for several days with great velocity, and tides of extraordinary extent occurred along the coast. These were due to the conjunction of the northeast winds with the usual astronomical conditions for spring tides, as the moon was at its nearest point to the earth on the 24th and full moon occurred on the 22d. Along Cape Cod many changes were made in the coast line. It is also reported that the waves dashed completely over the Minot's Ledge Lighthouse, which is one hundred and fourteen feet high. The rain and snow were excessive at certain stations, especially in eastern Massachusetts, while in Maine the storm was but little noticed.

Miscellaneous.—Auroras were generally reported on the 9th; on the 11th at Saint John, Belfast, Gardiner, Mayfield, and Burlington; and on the 17th (suspected only) at Cambridge.

The meteoric shower noted in the early evening of the 27th was due to fragments of the famous comet, known as Biela's comet. This comet in 1845 split in two parts, both of which were seen at its next return in 1852 but have not been seen since. The comet is believed to have broken up into fragments which cause periodic meteoric showers on dates which can be definitely predicted. A similar shower was noted in 1872.

The following is an extract from the Tennessee "State Board of Health Bulletin," for November, 1885, prepared under direction of J. D. Plunkett, M. D., President of the State Board of Health. The summary is prepared by Major H. C. Bate, in charge of the State Meteorological Service:

State summary.

Mean temperature, 47°.23; highest temperature, 82°, on the 7th, at Covington; lowest temperature, 18°, on the 26th, at Manchester and Hohenwald; range of temperature, 64°; mean monthly range of temperature 46°.83; greatest monthly range of temperature, 57°, at Milan and Covington; least monthly range of temperature, 33°, at Dickson; mean daily range of temperature, 15°.9; greatest daily range of temperature, 46°, on the 12th, at Covington, and on the 21st, at Sailors Rest; least daily range of temperature, 1°, on the 19th, at Riddleton, Florence Station, and Howell; mean of maximum temperature, 72°.67; mean of minimum temperatures, 25°.83.

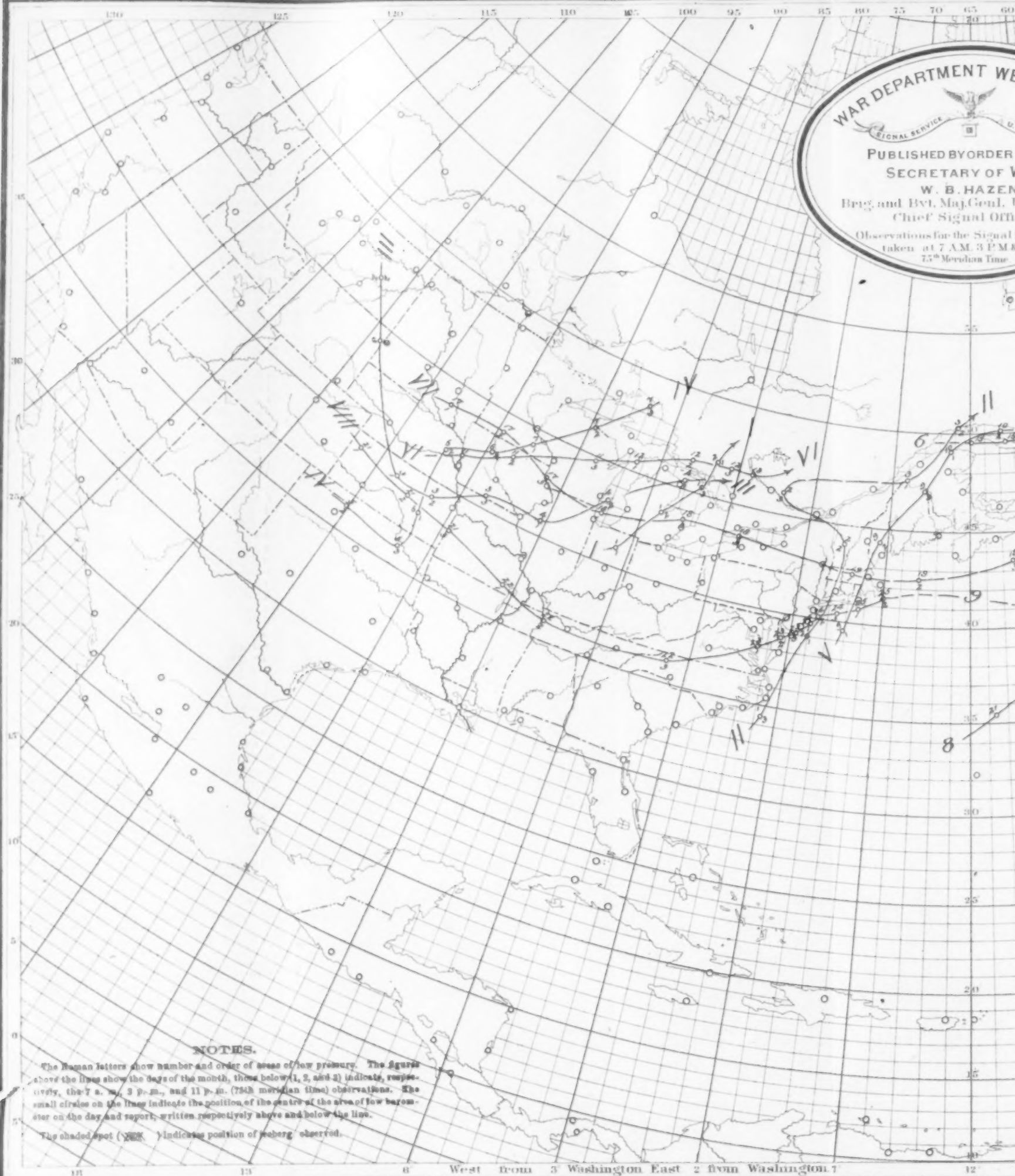
Mean depth of rainfall, 4.10 inches; mean daily rainfall, 0.137 inch; greatest rainfall, 6.65 inches, at Andersonville; least rainfall, 1.78 inches, at Sailors Rest; greatest local daily rainfall, 3.28 inches, on the 7th, at Grief; days of greatest rainfall, 6th, 7th, 18th, 22d; day of greatest rainfall, 7th.

Average number of days on which rain or snow fell, 8.7; average number of clear days, 10.4; average number of fair days, 7.8; average number of cloudy days, 11.8; rainless days, 9th, 10th, 14th, 15th; warmest days, 6th, 11th, 12th; coldest days, 26th, 27th.

Prevailing wind, north and northwest.

Chart I. Tracks of Areas of Low Pressure

Form 100-2-100-1



WAR DEPARTMENT WEATHER SERVICE

PUBLISHED BY ORDER
SECRETARY OF WAR

W. B. HAZEN
Brig. and Bvt. Maj. Genl. U. S. Army
Chief Signal Officer

Observations for the Signal
taken at 7 A.M. 3 P.M. 11 P.M.
75th Meridian Time

Pressure. November, 1885.

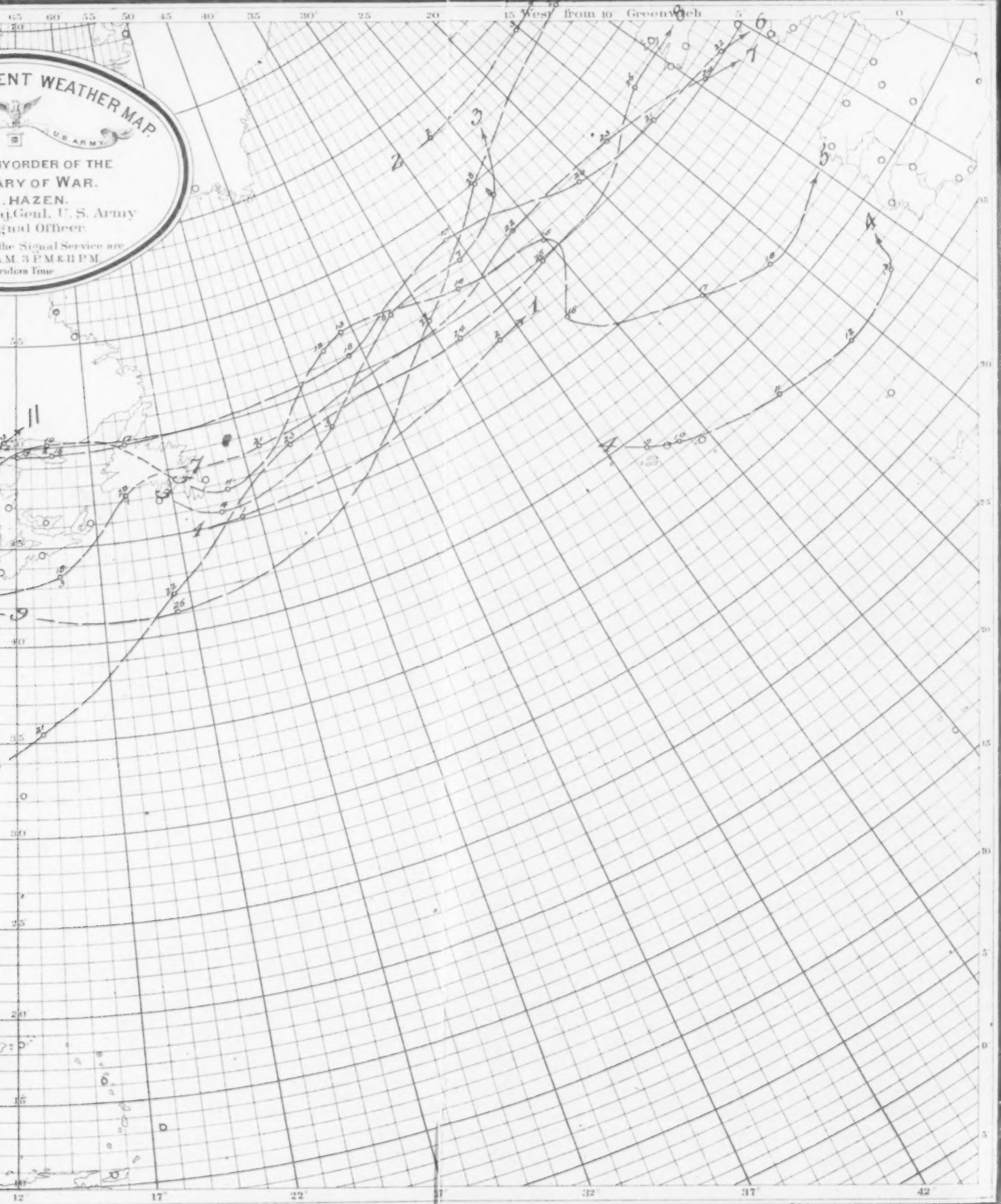


Chart II. Isobars, Isotherms, and Winds. November, 1885

Form 106 F.

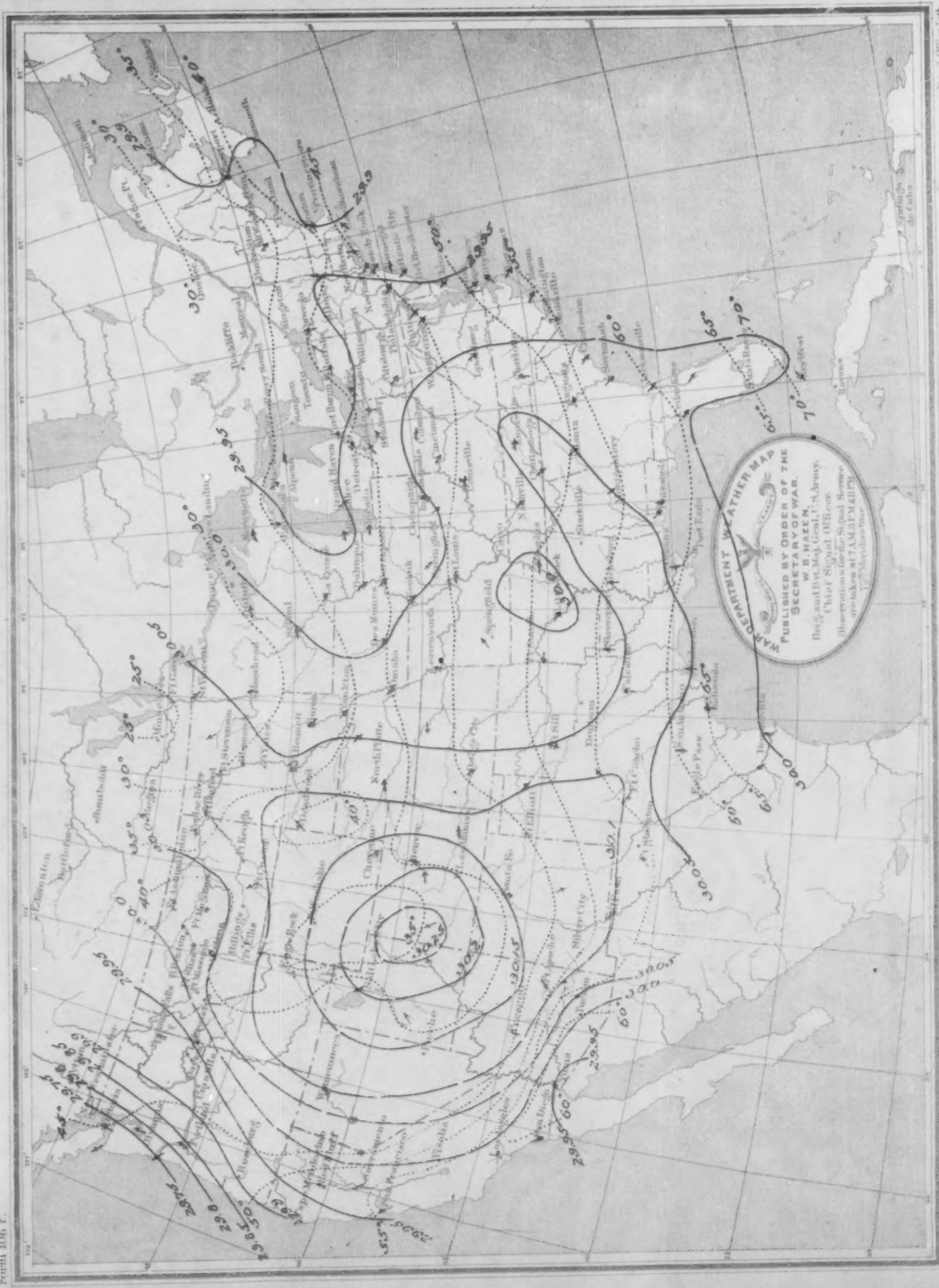
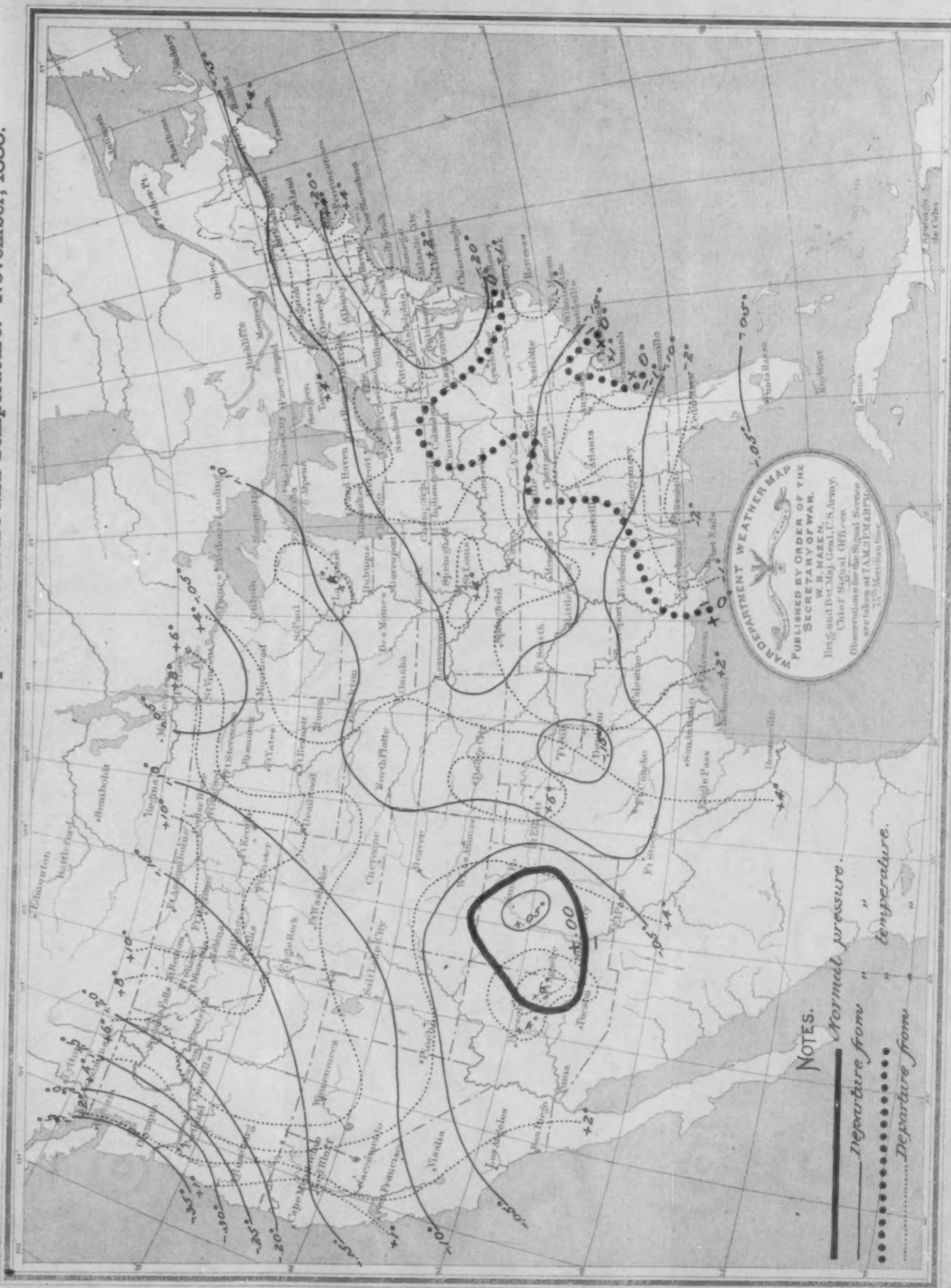


Chart III. Precipitation, November, 1885

Form 106 F.





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Alexander, S., Birmingham, Mich.	Dunton, Lieut. W. R., Dorset, Vt.	Jordan, Dr. M. D. L., Milan, Tenn.	Scribner, H. F. J., Stratford, Vt.
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Dewhurst, Rev. E., Voluntown, Conn.	Jackson Company, Nashua, N. H.	Shriver, Howard, Wytheville, Va.	Zimmerman, F. C., Bunker Hill, Ill.
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Day, Theodore, Dyberry, Pa.		Slenker, Mrs. E. D., Snowville, Va.	
Dawson, Wm., Spiceland, Ind.			
Davis, W. O., Bloomington, Ill.			

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for November, 1885.

Alcatraz Island, Cal.	Bridger, Fort, Wyo.	Keogh, Fort, Mont.	McHenry, Fort, Md.	Preble, Fort, Me.	Shaw, Fort, Mont.
Angel Island, Cal.	Concho, Fort, Tex.	Lyon, Fort, Colo.	Mount Vernon B'ks, Ala.	Randall, Fort, Dak.	Totten, Fort, Dak.
Assinaboine, Fort, Mont.	Columbus, Fort, N. Y.	Mason, Fort, Cal.	Meade, Fort, Dak.	Robinson, Fort, Nebr.	Townsend, Fort, Wash. T.
A. Lincoln, Fort, Dak.	David's Island, N. Y. H.	Madison Barracks, N. Y.	Niagara, Fort, N. Y. [Cal.]	Snelling, Fort, Minn.	Union, Fort, N. Mex.
Benicia Barracks, Cal.	Ellis, Fort, Mont.	McDermitt, Fort, Nev.	Presidio of San Francisco,	Saint Augustine, Fla.	Wingate, Fort, N. Mex.
Bidwell, Fort, Cal.	Fred Steele, Fort, Wyo.	Monroe, Fort, Va.	Plattsburg Barracks, N. Y.	Sully, Fort, Dak.	West Point, N. Y.
Brady, Fort, Mich.	Gaston, Fort, Cal.	McDowell, Fort, Ariz.	Pembina, Fort, Dak.	Sisseton, Fort, Dak.	Yates, Fort, Dak.
Brown, Fort, Tex.					

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for November, 1885.

Alabama State Weather Service, under direction of Prof. P. H. Mell, jr., Auburn, Alabama.
 Indiana State Weather Service, under direction of Prof. H. A. Huston, La Fayette, Indiana.
 Indiana State Weather Service, under direction of Prof. W. H. Ragan, De Pauw University, Greencastle, Indiana.
 Iowa State Weather Service, under direction of Dr. Gustavus Hinrichs, Iowa City, Iowa.
 Minnesota State Weather Service, under direction of Prof. W. W. Payne, Northfield, Minnesota.
 Missouri State Weather Service, under direction of Prof. Francis E. Nipher, Saint Louis, Missouri.
 Nebraska Weather Service, under direction of Prof. Goodwin D. Swezey, Crete, Nebraska.
 New England Meteorological Society, Prof. Winslow Upton of Providence, R. I., President; Prof. W. M. Davis, of Cambridge, Mass., Secretary.
 Ohio State Weather Service, under direction of Prof. B. F. Thomas, of the Ohio State University, Columbus, Ohio.
 Tennessee State Weather Service, under direction of Major H. C. Bate, Nashville, Tennessee.
 Data have also been used from meteorological records of the Central Pacific and Southern Pacific railway companies.

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BAROMETERS.

Common pattern and finish, vernier reading to 100th inch, in pine box:		
Reading down to 26 inches.....	\$30.00	Packing and shipping by express, \$2.50
do., 24 do.	31.00	do. 2.50
do., 20 do.	33.00	do. 2.50
do., 14 do. (two verniers).....	35.00	do. 2.50
Common pattern and finish, vernier reading to 1,000th inch, in pine box:		
Reading down to 26 inches.....	\$34.00	Packing and shipping by express, \$2.50
do., 24 do.	36.00	do. 2.50
do., 20 do.	40.00	do. 2.50
do., 14 do. (two verniers).....	54.00	do. 2.50
Best pattern and finish, vernier reading to 1,000th inch, in pine box:		
Reading down to 26 inches.....	\$36.00	Packing and shipping by express, \$2.50
do., 24 do.	38.00	do. 2.50
do., 20 do.	42.00	do. 2.50
do., 14 do. (two verniers).....	55.00	do. 2.50
Leather case, in place of pine box.....	8.00	do. —
Marine barometer.....	33.00	do. 2.50
Mountain barometer, two verniers, in leather case, to 20,000 feet.....	63.00	do. 2.50
Mountain barometer, two verniers, in leather case, to 10,000 feet.....	50.00	do. 2.50
Standard barometer for observatories.....	75.00	do. 3.25
Barometer tube (glass).....	1.25	do. 1.00
Barometer tube, filled and replaced.....	6.00	do. 2.50
Barometer cistern, complete.....	4.25	do. .60
Light brass tripod for barometer.....	10.00	do. .85

THERMOMETERS.

Thermometer for dry or wet-bulb.....	\$ 3.00	Packing and shipping by express, \$.60
do., wet-bulb, support for.....	.50	do. .25
do., do., cup for.....	.50	do. .25
do., dry-bulb, support for.....	.15	do. .25
do., maximum registering.....	6.00	do. .60
do., minimum do.	4.00	do. .60
do., solar radiation.....	10.00	do. .75
do., terrestrial radiation.....	7.50	do. .60
do., small, in metal case, for pocket, engraved stem.....	2.50	do. .25
do., water.....	3.00	do. .60

L. R. 11647, P. D., 1882.

Furnished by the Hohl Manufacturing Company, 13 Mercer Street, Baltimore, Maryland.

Anemometer, "Robinson's," (velocity).....	\$25.00	Packing and shipping by express, \$1.05
Electrical recording apparatus, "Gibson's," (velocity),	27.50	do. 1.05
Anemograph register (direction and velocity)...	80.00	do. 1.20

L. R. 11303, P. D., 1882.

Furnished by John McDermott & Bros., 310 Pennsylvania Avenue, Washington, D. C.

Wind vane, sunset.....	\$ 8.00	Packing, \$ —
do., large.....	65.00	do. 5.00
do., "Eccard's" attachment for use with anemograph.....	10.00	do. —
do., base for anemograph.....	10.00	do. —
Anemometer, telescopic rod for, new pattern.....	37.00	do. 3.00

L. R. 11327, P. D., 1882.

Furnished by L. H. Rogers, 75 Maiden Lane, New York City.

Signal Service manifold Forms No. 107 A, in books of 100 forms, per book.....	\$ 1.25
do., 107 B, do.	1.25
do., 107 C, do.	1.35
do., 107 D, do.	1.60
do., 107 E, do.	1.60
do., 107 F, do.	1.75
do., 107 G, do.	2.20
do., 107 H, do.	1.00
do., 107 H-sub, do.	1.75
Indications (Form 109 B), per hundred.....	.22

L. R. 13397, P. D., 1885.

Furnished by James J. Chapman, 915 Pennsylvania Avenue, Washington, D. C.

"Loomis'" Meteorology.....	1.60
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L. R. 4321, P. D., 1883.

Furnished by John Schultsback, 609 7th Street, Washington, D. C.

Rain-gauge, standard 8-inch Signal Service.....	\$5.00
Rain-gauge, galvanized iron, with overflow and measuring-stick.....	2.50
Rain-gauge, copper, with galvanized iron overflow and measuring-stick.....	1.50
Measuring-sticks, extra.....	.25
Farmers' weather case.....	54.70
Case for water thermometer.....	7.50

L. R. 4051, P. D., 1883. * L. R. 11275, P. D., 1885.

Furnished by Property and Disbursing Officer, Signal Service, U. S. A., Washington, D. C.

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Monthly Weather Review.....	.10
Copies of Daily Bulletin, with Synopsis, Indications, and Facts, with maps, stitched in monthly volumes, each (L. R. 10258, P. D., 1881).....	2.25
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District Maps, each.....	.02

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The office will be pleased to procure any of the articles, upon the receipt of their money value, including charges for packing and shipping, but all remittances by draft, money-order, or postal note should be made payable to the parties furnishing the articles desired. In case of money-orders state plainly to whom made payable, but send them in a separate letter. If requested by the parties ordering instruments, a comparison will be made with the standards in this office before forwarding, but, if not, they can be ordered direct, by reference to price list furnished from this office, except those furnished by Henry J. Green, successor to Messrs. J. & H. J. Green, which should always be ordered through this office. Purchasers must assume all risks of breakage when ordering instruments through this office. Postage stamps cannot be received as money.

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